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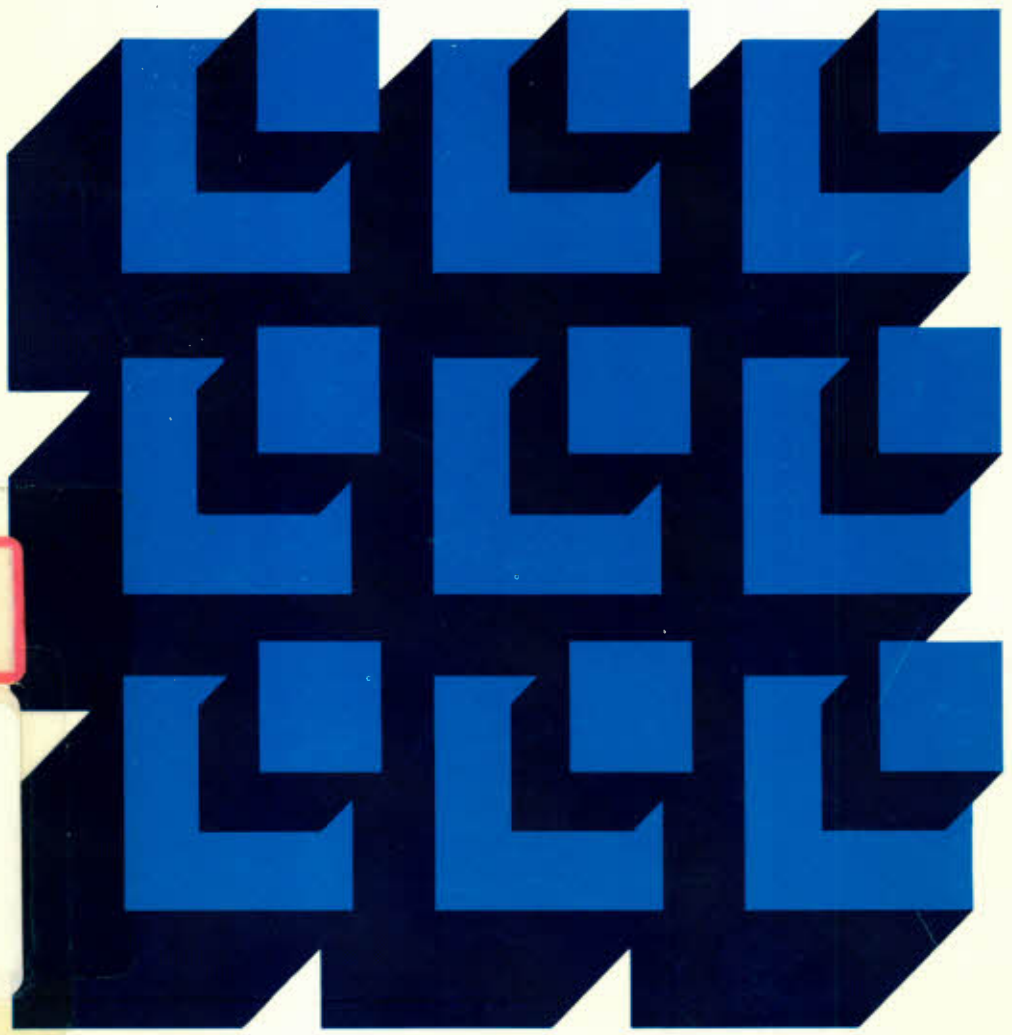

DISCUSSION PAPER NO. 356

Historic Rates of Adjustment in Prairie Farm Employment and Some International Comparisons

by

J. L. Serjak

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RÉSUMÉ

Dans cette étude, nous examinons le rythme d'adaptation des travailleurs agricoles dans les provinces des Prairies au cours des vingt-cinq dernières années, et nous comparons les résultats avec ceux de tout le Canada et d'autres grands pays producteurs et exportateurs agricoles. Depuis 1961, l'emploi agricole dans les provinces des Prairies a reculé de presque 40 %. Cette baisse devrait se poursuivre au cours des années à venir. En effet, nos projections, qui se fondent sur une analyse des tendances globales, indiquent que le nombre de personnes qui abandonnent l'agriculture continuera de croître.

Divers facteurs influent sur le rythme d'adaptation des travailleurs agricoles. Nous prenons en compte le revenu aux cultivateurs; le prix des ressources que les agriculteurs doivent se procurer pour la culture et l'élevage; le prix des terres et des immeubles; et le rendement par acre. Nous étudions également l'effet de la situation du marché du travail -- par exemple, la disponibilité d'emplois non agricoles -- ainsi que l'incidence de divers programmes publics d'aide financière.

Notre analyse des données a mis en évidence une corrélation significative entre le cours du blé, le taux de chômage et le nombre d'emplois agricoles. Les coefficients des autres variables ne sont pas statistiquement significatifs, mais ils affichent néanmoins une corrélation positive avec le nombre d'emplois agricoles.

Les agriculteurs de la région des Prairies ont réussi à quitter l'agriculture plus rapidement que ceux d'ailleurs au Canada. Si on les compare aux agriculteurs des États-Unis pour la culture du blé et qui, à bien des égards, ressemble aux Prairies canadiennes -- leur rythme d'adaptation au cours de la même période a été pratiquement égal. Les agriculteurs des Prairies canadiennes ont abandonné l'agriculture à un rythme moyen de 2,2 % par année, comparativement à 2,1 % par année pour les agriculteurs des Plaines américaines.

Dans d'autres pays, l'adaptation des travailleurs agricoles se déroule à des rythmes différents. Le rythme d'adaptation le plus faible se trouve en Australie, où moins de 1 % des agriculteurs en moyenne changent de profession tous les ans, et le plus élevé dans les pays de la Communauté économique européenne, où le taux se situe à 3,4 % par année en moyenne.

ABSTRACT

In this paper we examine the rates of adjustment in the farm employment in the Prairie provinces as they occurred over the last two and a half decades and compare them with Canada and other major crop producing and exporting countries. Since 1961 farm employment in the Prairies diminished by almost 40 per cent. This adjustment in farm employment is expected to continue in the future as our projections, based on the analysis of the historic trends, suggest that the farmers will continue to leave farming.

A variety of factors contribute to these adjustment trends. Among them we examined the following: the farm income from farm operations; the price of wheat received by farmers; the price of farm inputs that farmers must pay to produce crops and livestock; the price of land and buildings; and yield per acre. Furthermore, we examine the effect of labour market conditions, such as the availability of non-farm employment opportunities; as well as the impact of various government support payments.

Our analysis of historical data showed that there was a significant correlation between the price of wheat, and unemployment rate, and the level of farm employment. The coefficients of other variables were not statistically significant but positively correlated with the level of farm employment.

Farmers in the prairie region adjusted more rapidly out of agriculture than farmers in the rest of Canada. Compared with farmers in the Plains states – the most important wheat growing region in the United States and in many respects similar to the Canadian Prairies – the rate of adjustment for the same time period was almost the same. Canadian prairie farmers were leaving the land at an average rate of 2.2 per cent per year compared with 2.1 per cent annually for farmers in the U.S. Plains.

In other countries the adjustment of farm employment varied. The rates of adjustment were the lowest in Australia with farmers leaving agriculture at an average rate of less than one per cent a year, and highest in the European Community with farmers adjusting out of agriculture at an average annual rate of 3.4 per cent.

CONTENTS

FOREWORD

This study forms part of the Economic Council of Canada's project on the future of Prairie Agriculture. It focusses on the adjustments of Prairie farm employment over the past twenty-five years.

Specifically, this paper examines the principal factors which contributed to the adjustment in farm employment. The analysis of these factors is useful for a better understanding of the past patterns and provides the basis for the estimates of future trends. Furthermore, the paper relates the Prairie rates of adjustment to those of Canada and it compares the Canadian rates with those of other major grain exporting countries in the world.

The author, John L. Serjak, is a staff economist with the Economic Council of Canada.

Judith Maxwell
Chairman

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The responsibility for any errors rests solely with the author.

1. INTRODUCTION

1.1 Introductory Statement

Farming plays an important role in Canada's economy, particularly in the Prairie provinces. Even though agriculture's share in the gross domestic product is a modest 3 per cent, and its employment as proportion of total employment less than 5 per cent, its contribution to total exports is very significant.

Canada is one of the major wheat exporting nations in the world and must therefore compete for its share of the international markets. In order to maintain that share in this fiercly competitive market the agricultural sector must be capable of adjusting to new situations and must maintain a high level of efficiency.

1.2 Objective

The objective of this paper is to determine and examine the underlying factors influencing the historic rate of farm employment adjustment in Canadian agriculture in general and in the Prairie provinces in particular. There are numerous factors which directly or indirectly affect the employment

patterns in the agricultural sector. We focus our attention on a number of them, among others, the impact of wheat prices, the price of farm land, yield levels, unemployment rate, government subsidies and stabilization payments, and net farm income. In addition to these, we also examine the income levels and accessibility to employment opportunities in other industrial sectors. All of these factors could at any given time in some measure play a role in decisions to either leave the farm or stay on the land, or indeed, to enlarge operations.

Finally, we examine the similarities in the agricultural sector of some of our major competitors such as the United States and selected E.E.C. countries. We analyze the historic rates of adjustment of these countries and compare them with Canada's experience, to see if they are adjusting slower or faster than we are.

1.3 The scope of this paper

The Canadian agricultural sector, just like other industrial sectors, is not a static and unaltering entity, but rather a dynamic and changing sector which adapts to changes engendered by the global economic activity. It is a natural and inevitable development that farming adjusts to the needs of the food system of an industrialized society, to

technological advances, and to market opportunities. The most important factor in the agricultural activity is the human factor - in other words, the labour force which is at any given time available to, and engaged in production of agricultural goods.

The scope of this paper is therefore to examine the ebb and flow of employment among industrial sectors, particularly as it concerns employment in the agricultural sector. For the purpose of this paper, when we refer to structural adjustments in agriculture we limit the term to the historic changes in farm employment. On the basis of our examination of the underlying causes of these historic changes, we estimate the possible farm employment levels in the future, up to the year 2000.

1.4 Data definition and data limitations

Agricultural employment data consist mainly of the numbers of farm operators or self-employed, unpaid family members, and hired labour. With regard to farm employment, we chose to use The Labour Force data as published by Statistics Canada. The Labour Force survey on which these employment data are based underwent conceptual, definitional, and methodological changes in 1975. We discuss these changes in Appendix A.

Unfortunately, the disaggregated data of farm employment for individual states in the United States are not available for the years after 1980. We have therefore selected some of the major U.S. farm states which have similar climatic conditions and patterns of crop production. For these we then estimated employment levels of their respective farming sectors.

Similarly, the data for the E.E.C. countries too, are not as detailed as those for Canada. While the historical series are not as lengthy and detailed as we would wish, they nevertheless afford sufficient information for our analysis.

1.5 Order of Analysis

First we trace briefly the long term historical development of Canadian agriculture. We identify two segments of this process, one being the period from the 1880's up to the World War II, and the other segment dealing with the post-war era, more specifically with the period from 1961 on. We look at the changes in employment, in real output, and in output per employed in farming, as they occurred over the past two and a half decades or so, for which we were able to obtain sufficiently disaggregated data.

We then proceed to examine the scene in Manitoba, Saskatchewan and Alberta. Each of the Prairie

provinces is unique in its geographical and social profile and each exhibits a different pattern.

We then turn to the United States. The Northern and Southern Plains States and the Canadian Prairie provinces share many similarities. Both regions have a continental type of climate with cold and severe winters followed by short hot summers with low levels of precipation. The main economic activity in agriculture is concentrated predominantly in grain production. Among the Plains states, Kansas is by far the biggest in terms of producing area, having more than 11,000,000 acres dedicated to wheat. It most closely resembles the province of Saskatchewan. Both in the Prairie provinces and the Plains states the production of wheat represents a major source of farm income. Furthermore, the crop growing regions in both countries are rather removed from industrial centers which makes the move from farm to non-farm occupations quite difficult.

Finally, we examine the structural adjustment trends in the agricultural sector of the European Economic Community, and Australia. A number of countries in the Community are not only self-sufficient in production of wheat but also have become aggressive and highly competitive exporters in recent years. In additon, their farming sectors have been adjusting to changes over time. We will attempt to establish how these adjustment rates compare with those in Canada and

establish whether or not their structural shifts are more pronounced than those in Canada or the United States.

2. ADJUSTMENT IN CANADIAN AGRICULTURE

2.1 Historical Setting

A little more than one hundred years ago Canada was predominantly agricultural society. The majority of Canadians had a close acquaintance with the farming experience, either as a result of living on a farm or having relatives whose income and livelihood originated on the farms. In the 1880's when the first Canadian transcontinental rail line was completed about 60 families out of every 100 were farm families. More than three-quarters of the work force was then engaged in farming. By contrast, in Canada's city-centered society today, less than 5 per cent of total employment is engaged in farming activities. At most, 3 to 4 Canadian families out of every 100 are farming.

In the early 1900's there was a sudden and sustained surge of net immigration and land settlement. Many factors contributed to this phenomenon. Much of the land in the United States had been occupied by then while vast stretches of excellent prairie land remained unsettled in Canada. Other

factors included policies which favoured large scale immigration, better prices for agricultural products and a great expansion of Canada's transportation system. The war-torn countries of Europe provided large numbers of immigrants during the 1920's. In the first thirty years of the 20th century there was an expansion of 100 million acres in farmland in Canada from 63 to 163 million acres. During the Depression of the 30's, the rate of land settlement slowed down and only 10 million acres of land were added. There has been little change since 1941, and the total area in farms today is no larger than it was prior to the Second World War.

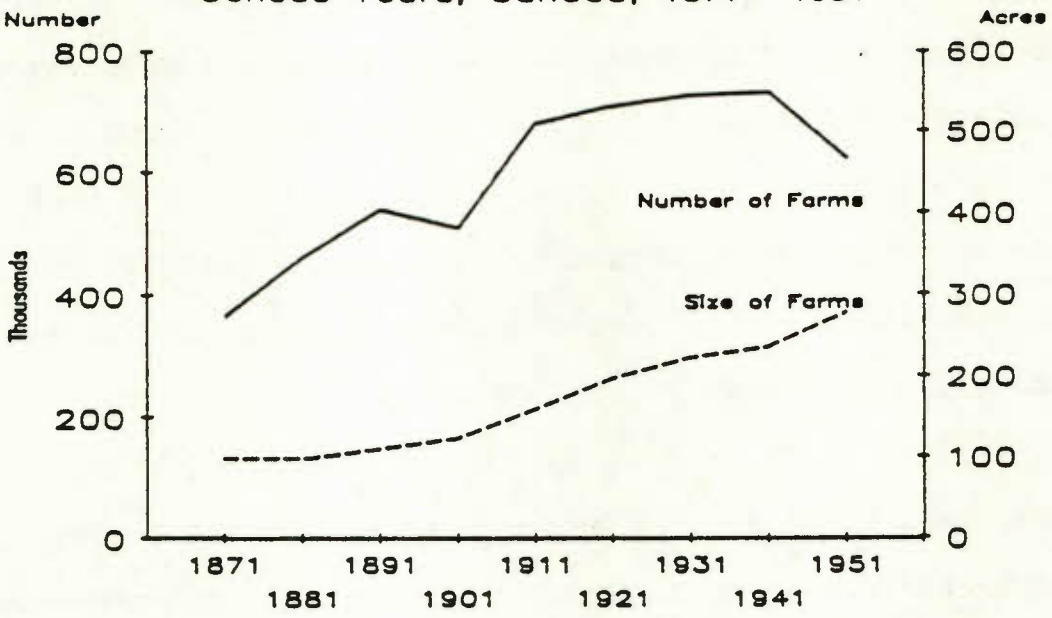
In the early decades of this century the number of farms increased steadily and reached the peak in 1941 of some 730,000 farm units (Chart 1). The Second World War had a decisive impact on the structure of the Canadian economy. During the five years, from 1939 to 1944, Canadian Armed Forces expanded from less than 10,000 to almost 780,000. Employment in manufacturing and transportation nearly doubled, and unemployment dropped from over 500,000 persons to less than 65,000. In contrast to these substantial increases in employment in the rest of the economy, agricultural employment shrank considerably from 1.4 million to less than 1.2 million. This was the beginning of a prolonged period of labour and resource adjustment. After a short-lived rise in the immediate post-war period, the

downward trend continued and was reflected in a sustained exodus from agriculture; farmers were leaving the land and sought employment elsewhere. Those who remained acquired more land and as a result, the average size of farm units increased dramatically.

What were the factors which contributed to, or brought about this structural adjustment? Have they diminished in their importance and influence in the last twenty-five years and are no longer relevant today? Or, have new elements entered into the picture in the last two and a half decades that did not exist before? Has the historic trend in the adjustment process changed significantly in the last few years? There is some evidence which suggests that the employment pattern has shifted in recent years.

CHART 1

Number of Farms
and Average Size of Farms
Census Years, Canada, 1871 - 1951



Source Urquhart and Buckley: Historical Statistics of Canada; Statistics Canada: Census of Agriculture, various issues.

2.2 Trends in the last 25 years.

The rate of decline in agricultural employment varied considerably over the years. The post-war momentum of rapid structural employment adjustment in Canadian farm population was carried over right into the sixties and the early seventies. Indeed, there were periods in which the exodus from agriculture was particularly strong; for example, between 1961 and 1974, the farmers were leaving the land, on average, at a rate of 2.7 per cent per year.

Farms have become fewer, larger and more specialized; they have also become more capital intensive and large users of

borrowed capital. In the main, the results of these changes have been beneficial insofar as they brought about a highly productive food system and an abundant supply and variety of food products. Consumers can now purchase the products with a relatively low and falling portion of their disposable income. But the other side of the coin presents a less attractive picture. Structural changes in agriculture also carry a hidden social cost to farming people, to the rural communities and society at large.

Heavy debt loads endured by many farmers, and the loss of infrastructure among diminishing numbers of the more remote farm population represent serious problems. Many farmers are holding down more than one job, and fewer people possess the means (large capital) to become established in agriculture. The concentration of farm lands among fewer farmers also contributed to disappearance of some rural communities and to the decline of a way of life known to past generations.

Agriculture lost a significant portion of its labour force to other occupations. As farmers were leaving the land in increasing numbers, employment on Canadian farms was declining both in absolute terms and as a proportion of total employment. In absolute terms, employment dropped to its lowest level in 1982 when it stood at 462,000 as compared to 681,000 in 1961.

Compared to total employment, agriculture's share was slightly above 11 per cent in 1961. Since then, this share has been shrinking steadily. To be sure, this decline in the agricultural share has not been uniform over time. We see the most rapid decline during the 1960's, after which a more gradual but steady reduction is evident. The rate of decline now seems to be levelling off, although still sloping in a downward direction; over the past decade the share has remained below 5 per cent, settling at just about 4 per cent in 1987.

However, in the most recent years, we observe somewhat larger numbers of people engaged in farming activities. In 1986 and 1987, there were 484,000 and 475,000 persons respectively employed in agriculture - the numbers unmatched since the early seventies.

In the light of the fact that the price of wheat received by farmers has been declining steeply and steadily since 1980, it is difficult to explain at this point in time the increases in farm employment in recent years. The world markets enjoy an abundant supply of wheat which shows no sign of immediate disappearance. Therefore, the prospects for sustained high levels of income, or attractive returns on investment would appear to be less than favorable.

2.3 Output, and Output per employed farm worker

Despite the massive reduction of agricultural employment, the volume of agricultural production has not declined. In fact, over the past two and a half decades, the total volume of agricultural production has increased by more than 70 per cent. In broad terms, this expansion of production has been widespread and not limited to any particular segment of agricultural activity, and has thus affected most of the agricultural production.

A major factor in the expansion of the volume of production has been the increased productivity of labour and material inputs. Indeed, during the period under observation, the growth in productivity in Canadian agriculture as measured by output per person was stronger than in most other sectors of the economy. For example, during the last 26 years, the output per person in agriculture increased at an annual rate of 3.5 per cent compared with that of the manufacturing sector of 3.0 per cent (Table 1).

Eventhough the growth in output per person employed has been steady and strong vis-à-vis other sectors of the economy, the levels of output in agriculture have lagged behind. While the gap between the levels of output per person in agriculture and manufacturing has narrowed in recent years, it would require a substantially higher and sustained rate

of growth in agricultural output to achieve the levels of output in other sectors, such as manufacturing.

TABLE 1

OUTPUT PER PERSON IN AGRICULTURE AND MANUFACTURING, CANADA
1961-1987 (Selected Years),
1981 Dollars

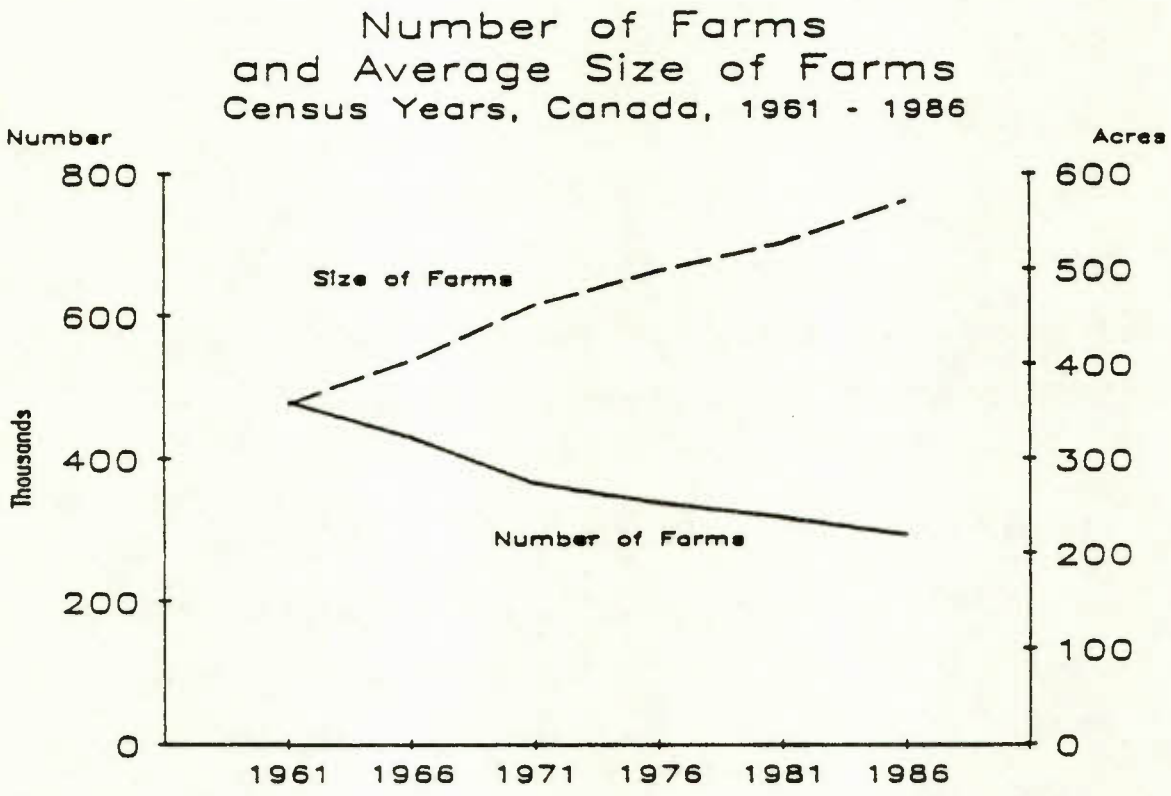
	Level of output			Growth rates	
	Agriculture	Manufacturing		Agriculture	Manufacturing
1961	10,132	16,966	1961-65	11.1	6.3
1965	15,424	21,672	1965-70	1.6	1.9
1970	16,655	23,853	1970-75	5.4	2.9
1975	20,095	27,579	1975-80	0.2	.4
1980	20,326	28,167	1980-85	2.3	4.5
1985	22,754	35,100	1985-87	4.4	1.9
1987	24,779	36,432	1961-87	3.5	3.0

Source Statistics Canada and estimates by Economic Council of Canada.

The most significant contribution to growth in labour productivity has come through adjustments in agricultural employment. In contrast to a few decades ago, a substantially greater output is now produced by significantly fewer farmers. As older farmers retired and many of the younger farm people found employment in non-agricultural sectors, the remaining land was absorbed into larger farm units. The restructuring of farm employment and the resultant redistribution of arable land among ever fewer farm units brought about a dramatic increase in the average size of farms. While the average size of farm was about 570 acres in 1986, an increase of almost 60 per cent from

the 1961 average size, the number of farm units dropped from a level of almost half a million in 1961, to less than 300,000 in 1986, a decrease of almost 40 per cent (Chart 2).

CHART 2



Source Statistics Canada, Census of Agriculture, and estimate by Economic Council of Canada

These large-size farm units could then be operated with larger, more powerful and more efficient machinery with little additional labour. As a result, farmers were investing increasingly in capital and material inputs related to mechanization. These expenditures are reflected in greater use of tractors, combines, trucks, balers, and other farm equipment, as well as greater expenditures on machinery maintenance and repairs, fuels and lubricants.

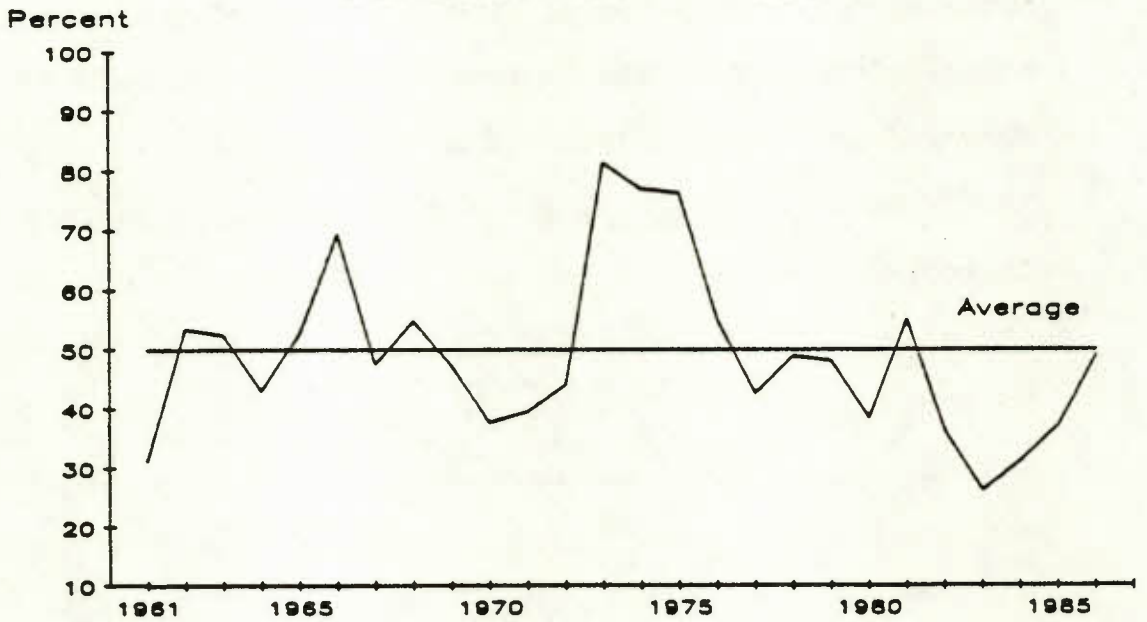
Besides mechanization, other factors contributed strongly to the overall growth in total output and to enhanced productivity levels, such as improved crop yields. Inputs with regard to crop yields would include purchases of fertilizers, lime, seed, and insecticides.

In addition to capital and material inputs, there are also the so called "other" factors which contribute in no small measure to greater productivity gains and consequently to greater total output. These are the results of research conducted at universities, experimental stations, government research institutes, and private enterprises. They can also come from increasing farm size, better farm organization, increased skills and education of farmers, and other such factors.

Even though real output, and output per employed farm worker has been increasing, the income from farm operations received by farmers on average did not keep pace with wages earned in the non-farm sector. For Canada as the whole, the ratio of farm to non-farm income over the past quarter century has remained virtually unchanged, averaging at about 50 per cent (Chart 3).

CHART 3

Farm Income as Percent of Non-Farm Income Per Worker, Canada, 1961 - 1986



Source Statistics Canada, Agriculture Economic Statistics, National Income and Expenditure Accounts, and estimates by Economic Council of Canada.

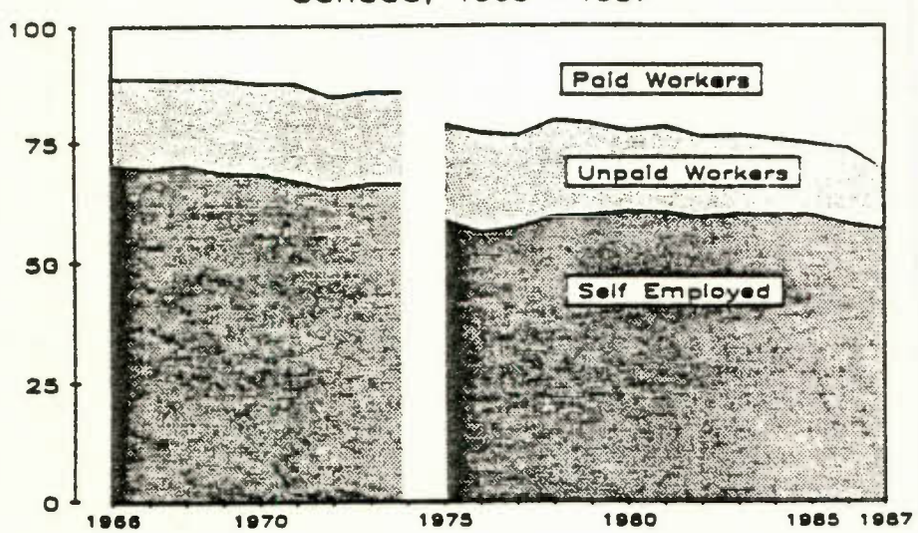
3. ADJUSTMENT IN THE PRAIRIE PROVINCES AND THE UNDERLYING CAUSES

3.1 Changes in employment

Farm employment is defined as consisting mainly of farm operators, or the self-employed; unpaid workers, among whom we find primarily family members, and paid or hired workers. The ratios among these three groups remain relatively stable over time. In the last ten years we notice, however, fewer unpaid workers and an almost concomitant increase in the number of paid workers. The number of farm operators on the other hand has remained virtually unchanged over the last ten years. This may be due to some extent to the methods employed in collecting the data. Chart 4 below traces the movements and relative positions among the three types of workers.

CHART 4

SHARES OF FARM EMPLOYMENT
BY TYPE OF WORKER
Canada, 1966 - 1987



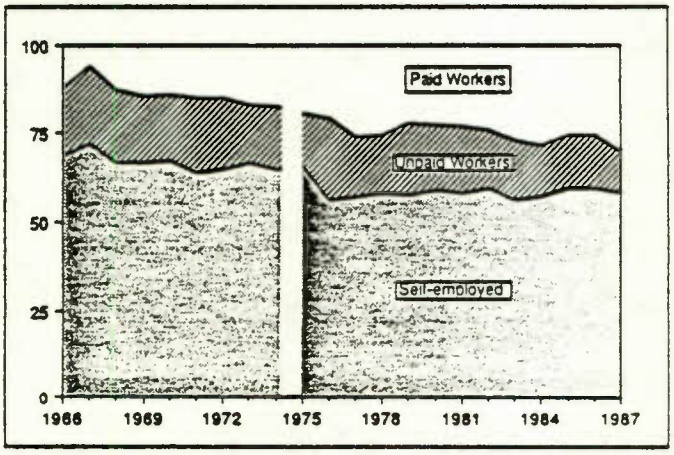
Note For the break in 1975 see explanation in Appendix A

Source Statistics Canada, The Labour Force Survey, unpublished data, and estimates by Economic Council of Canada.

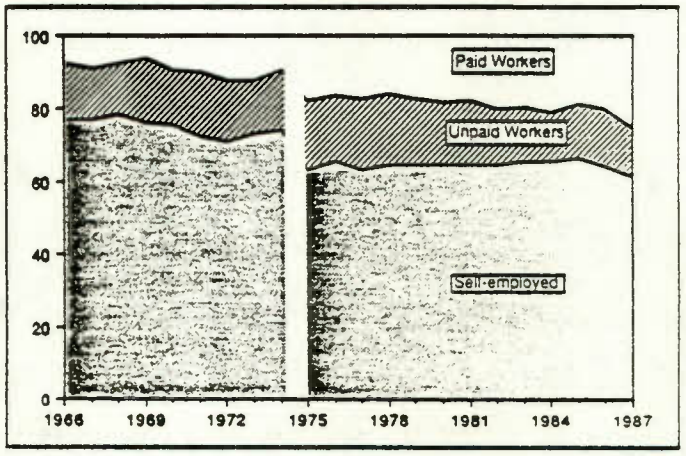
CHART 4-A

SHARES OF FARM EMPLOYMENT BY TYPE OF WORKER, PRAIRIE PROVINCES 1966-1987

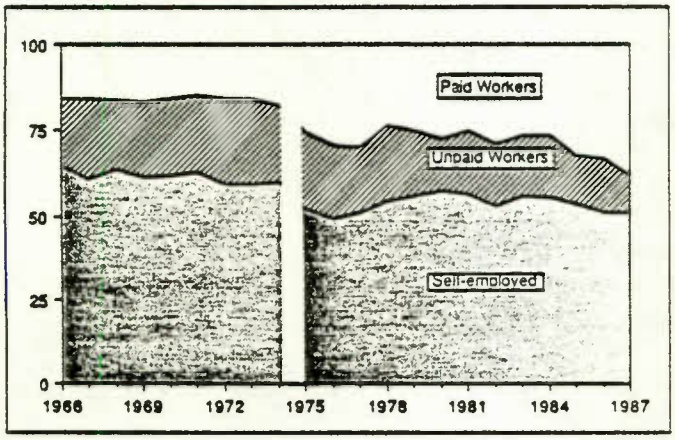
Shares of Farm Employment by Type of Worker, Manitoba, 1966-87



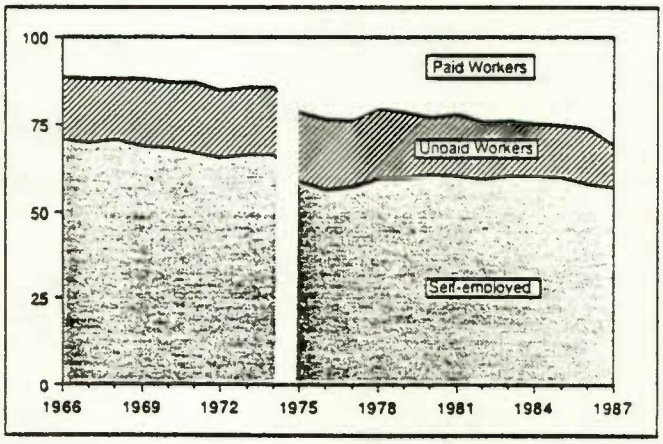
Shares of Farm Employment by Type of Worker, Saskatchewan, 1966-87



Shares of Farm Employment by Type of Worker, Alberta, 1966-87



Shares of Farm Employment by Type of Worker, Prairies, 1966-87



Note For the break in 1975 see explanation in Appendix A

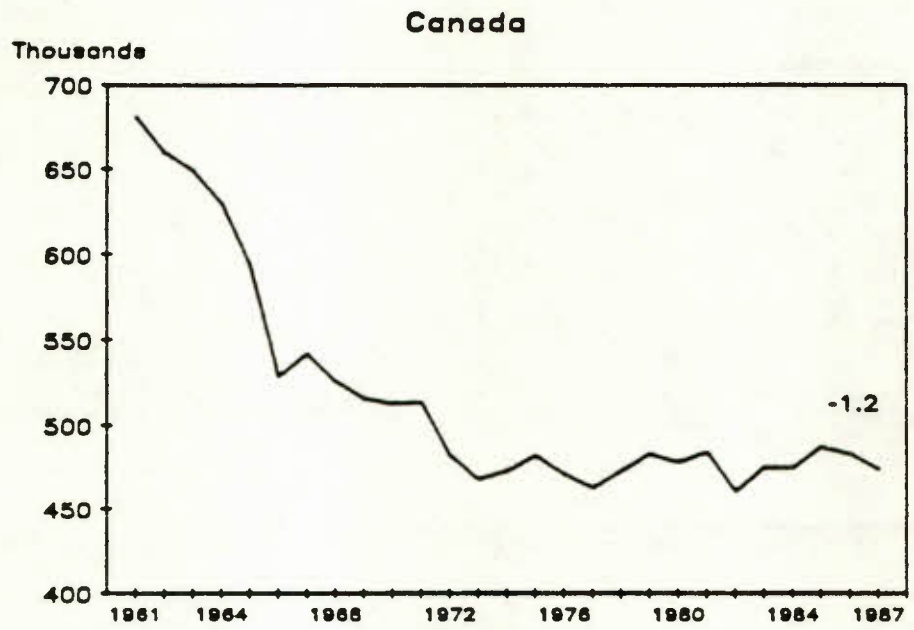
Source Statistics Canada, The Labour Force Survey, unpublished data, and estimates by Economic Council of Canada.

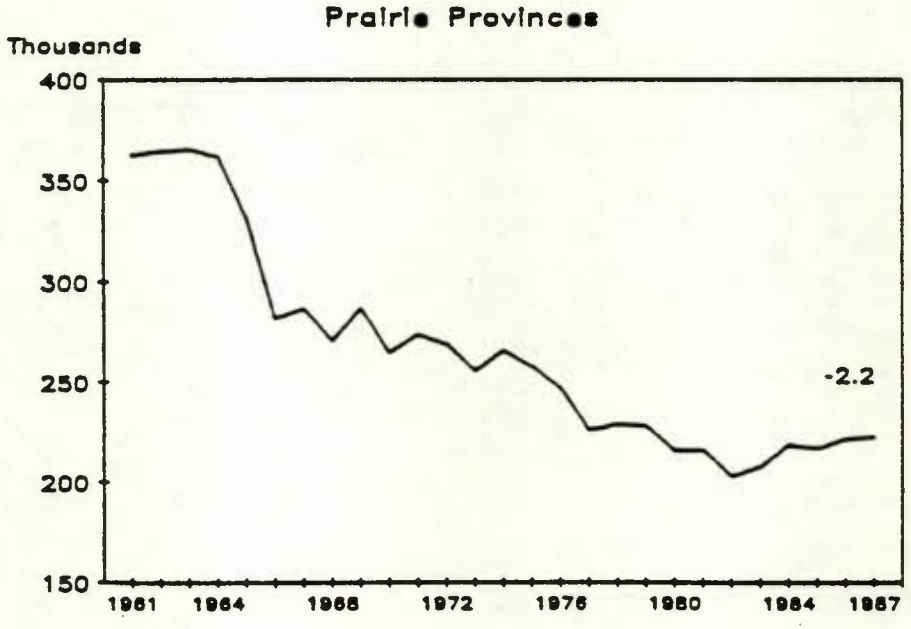
It comes as no surprise to members of the farming community in the three Prairie provinces to learn that their numbers have been diminishing for some time now. Various statistical data sources on farm employment show a continuous downtrend for all three provinces. Over the last quarter century, Saskatchewan exhibits the steepest decline, particularly in the early sixties and then again shows a drop in the mid seventies. Even though Saskatchewan adjusted more rapidly than the other two prairie provinces, the level of agricultural employment is still higher there than in either Alberta or Manitoba. The long term trend in Alberta follows a similar path to that of Saskatchewan although the two are by no means synchronous. Manitoba, on the other hand, experienced a more gentle out-flow of farmers over time. The slope of the trend is less pronounced than in the case of the other two Prairie provinces, but it nevertheless points to a net decrease in farm employment.

The rates at which the adjustment has been taking place differ substantially among the provinces. Similarly, the periods of heavy out-migration did not all occur at the same time in all three provinces. (Chart 6).

CHART 5

Employment in Agriculture and Average Annual Rate of Change 1961 - 1987

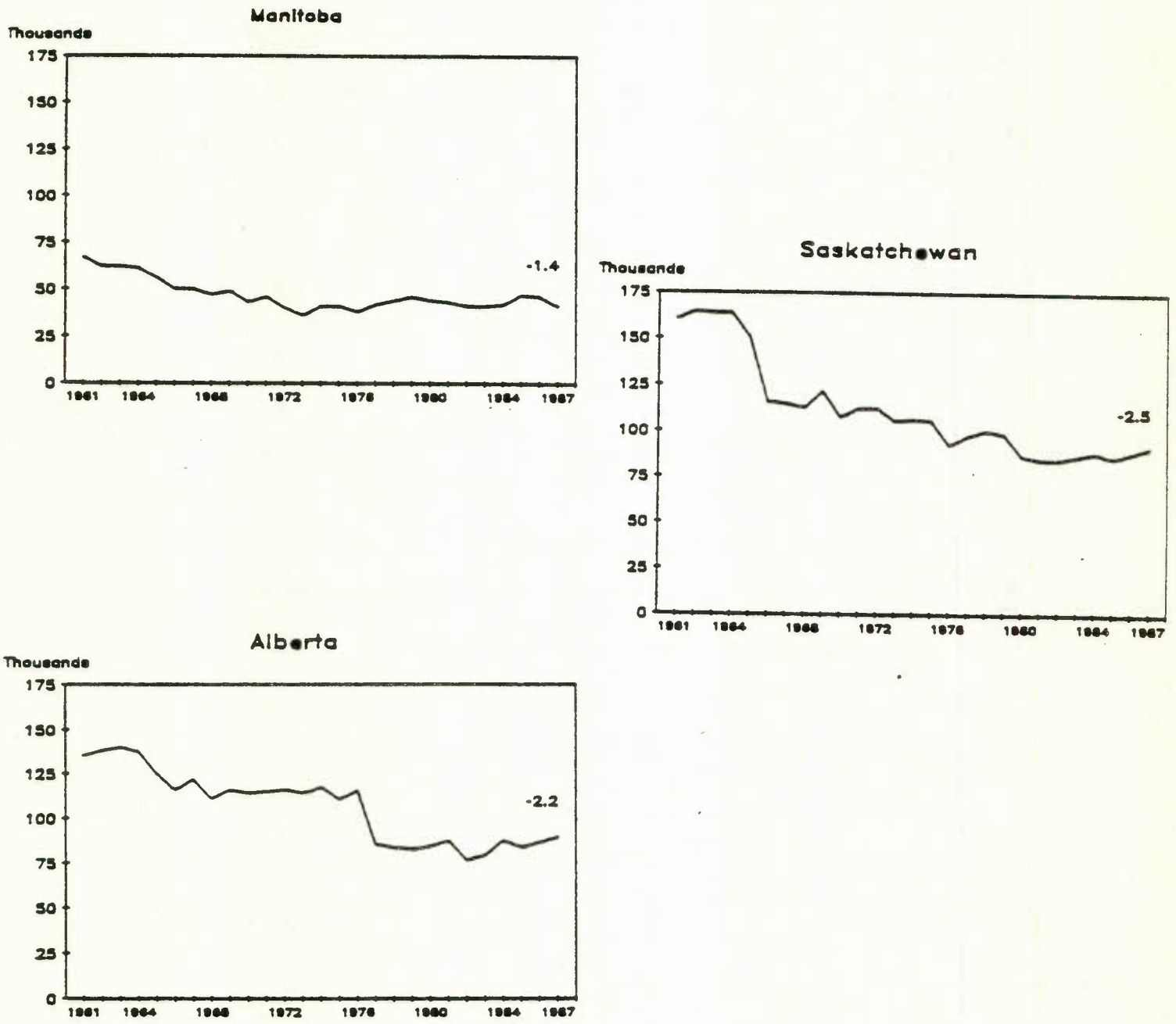




Source Based on Statistics Canada, The Labour Force and estimates by Economic Council of Canada.

CHART 6

Employment in Agriculture and Average Annual Rate of Change Prairie Provinces, 1961 - 1987



Source Based on Statistics Canada, The Labour Force and estimates by Economic Council of Canada.

As mentioned earlier, the employment numbers of the last decade show a levelling-off of the historic downtrend; indeed, since 1982 when the lowest point in farm employment was reached, statistics now point to an upward trend. Farm employment levels are up in all three provinces. For the region as the whole, the increase between 1982 and 1987 is roughly 10 per cent. Both Saskatchewan and Alberta continued to register additions to farming labour force in 1987. Manitoba, on the other hand, recorded a net reduction from 1986.

This recent change of direction in the structural adjustment in farm employment is not in line with the long term historical trend. As yet, our statistical analysis of the long term trend offers no explanation for this deviation from the historical patterns. At this time, we do not know if these recent shifts in structural employment are only a short term phenomenon which will before long see a return to the long term trend of gradual out-flow of farmers from the agricultural sector.

This deviation from the historical pattern of farm employment adjustment of recent years notwithstanding, our projections based on long term trends indicate a continuation of the downward adjustment in farming population. Our estimates show that for the Prairie region as the whole, farm employment numbers by the year 2000 will have diminished by

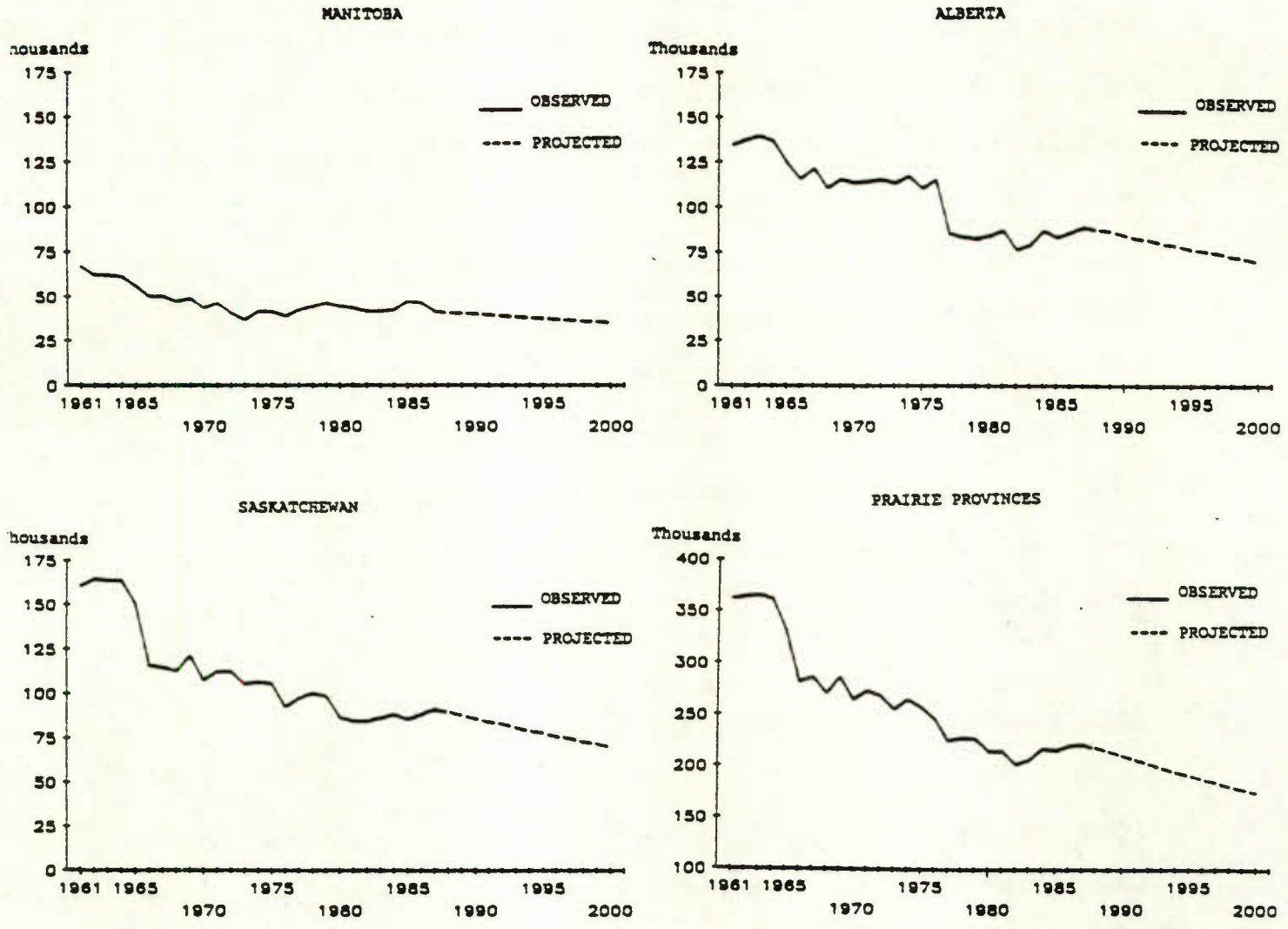
approximately 75,000 persons. Of the three provinces, Saskatchewan will account for almost one half of this amount, reducing the number of farmers by some 35,000 which translates into a drop of 38% from the 1987 level. Alberta too is estimated to reduce substantially the number of farmers by the year 2000. We project a drop of around 31,000 persons, a decrease of about 34% from the 1987 numbers. Manitoba, on the other hand, is estimated to loose some 9,000 farmers or close to 22% of the 1987 figure. (Chart 7).

CHART 7

EMPLOYMENT IN AGRICULTURE

1961 - 1987

AND PROJECTIONS TO 2000



Source: Statistics Canada, The Labour Force and estimates by Economic Council of Canada

3.2 Underlying causes of changing employment in agriculture

The decision to leave the farm or to enter into farming is in most cases a difficult one and is usually made after much consideration of a variety of factors. It is impossible to list all of them here, but there are some major ones that we would expect to be important. Among these are: the farm income received from farm operations and factors closely related to farm income such as the price of wheat received by farmers, the price of farm inputs that farmers must pay in order to grow and cultivate the crops, the prospects of future returns, and the price of land and buildings. Aside from these factors, labour market conditions such as the availability of hired labour and the prevailing unemployment rate may be significant. Some would also include the effects of various government support payments. The mix varies overtime and some of these factors carry a greater importance than others.

a.) Farm income vis-à-vis non farm income

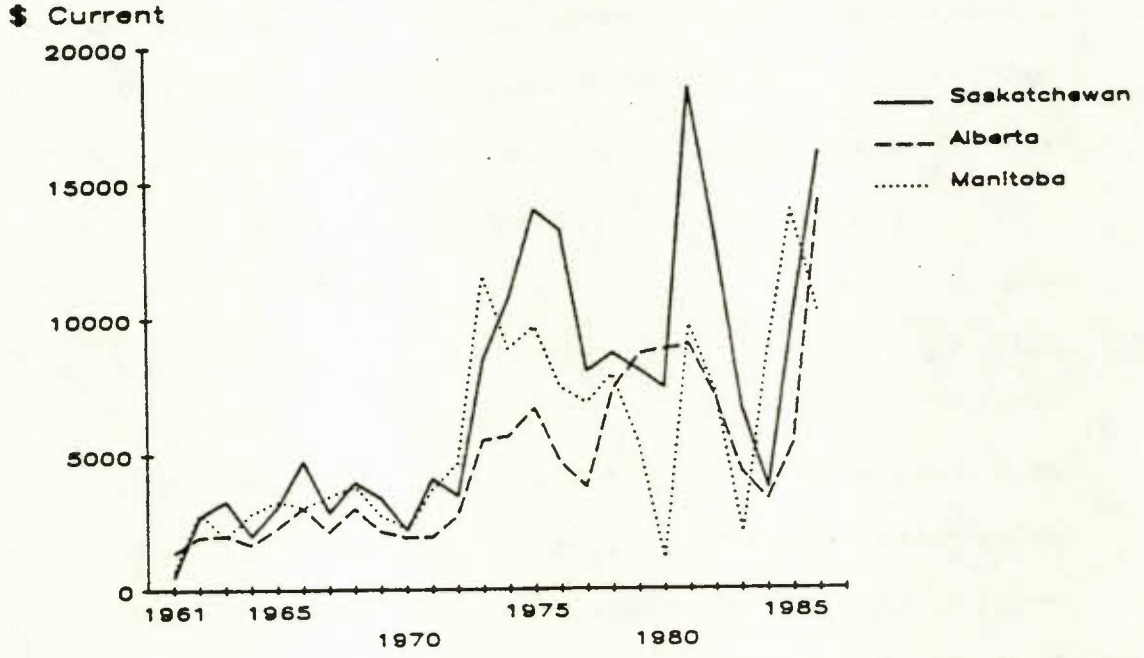
Over the years farmers have had to deal with the problem of low incomes, low by comparison with income earned in non-agricultural industries. Of widespread concern to both farmers and government officials who deal with agriculture is the fact that farmers not only earn less than their

counterparts in the city but also have incomes that are much less stable.

In the Prairie provinces the net income per employed worker traces a particularly volatile pattern. While farm income from farm operations for all the Provinces is affected equally by the world price for wheat, the climatic variations will cause the crop production to be vary from province to province. A drought or excessive or untimely rainfall may be less severe in one province than in another. Consequently, the peaks in levels of income at a given time in one province are not necessarily achieved in the others in the same year (Chart 8).

CHART 8

Net Farm Income per Employed Worker, Prairie Provinces, 1961-86



Source Statistics Canada, Agriculture Economic Statistics, and estimates by Economic Council of Canada

In the early seventies when the price of wheat as measured in constant 1981 dollars soared to record levels, farmers' net income briefly exceeded the levels of non-farm income, but this has since been declining steadily. The price of wheat shot up again in the late 1970's and early 1980's but the inflation ate up most of the gain.

Higher urban incomes serve as an incentive to leave agriculture. We would expect therefore, higher rates of migration from farm to non-farm occupations at times of low farm incomes, and conversely, lower rates of migration at times of higher farm incomes. The examination of the data, however, tells us that this is not the case. While the non-farm income levels may well have been a factor in the decision of some farmers to seek employment elsewhere, they are not statistically significant. Our analysis show that over the historical period under study there is no significant correlation between farm employment and farm income received from farm operations.

b.) Land Values

What impact do land prices have on the level of farm employment? Does the value of land motivate farmers to sell their farms and leave agriculture? During the mid and the late 1970's land prices began to climb dramatically. This situation gave an incentive to some farmers to sell out, reap

large profits, and retire from farming, these large capital gains affording them good income. It also served as an incentive for other farmers to buy out existing farmers basing their decision to enter farming on the belief that grain and land prices would continue to rise indefinitely. These transactions were greatly facilitated by the ready availability of cash necessary for one farmer to buy out another. These circumstances taken together could explain at least in the short run how rising land prices might bring about a net outflow of farmers. One would expect, therefore that in times of falling land prices and falling wheat prices such as was the case in 1980's would have the opposite impact. Farmers would be unwilling to sell and suffer capital losses, fewer individuals would be prepared to take a chance with farming, and furthermore, the declining equity values would make it more difficult to obtain credit and loans for expansion. Our analysis of the historical data shows, however, that there exist no significant correlation between the price of land and the level of farm employment. While the value of land well may have played a role in some farmers's decision to leave farming, it has nonetheless no statistically significant impact on the overall level farm employment.

c.) Effects of Wheat Price

Our examination and analysis of historical data identify some factors which explain the past trends in structural adjustments in farm employment. Among these are the unemployment rate, and the price of wheat received by farmers or, to be more specific, the unemployment rate lagged one period, and the price of wheat per bushel deflated by the farm input price index, also lagged one period. They were lagged because farm receipts in the prairie region often do not relate to the current year but to the preceding year.

The most important item in the equation of farming operations is, of course, the price received for the commodity produced. Higher prices increase the expectations of higher immediate income and encourage the farmers to stay. Some may be inclined to expand and will seek opportunities to enlarge operations in order to secure enhanced levels of earnings. The prospect of a good return on investment, on the other hand, attracts some others to enter into farming. Young family members are more inclined to take over the family farm and continue farming rather than to abandon the land for the cities.

The results of our analysis reveal that there is a significant correlation between the price of wheat that

farmers receive for their product and the levels of farm employment. Naturally, the price of wheat fetched on the market will, in the final analysis, determine the viability of the enterprise, the level of earnings and, ultimately the decision whether to stay in farming or abandon the land.

We also looked at the question of increased yield levels as determined by output per acre. By enhancing the yield, the same output could be produced with a smaller acreage and fewer labour inputs. Alternatively, a higher yield would enable farmers to raise production by harvesting reduced areas without additional labour.

The findings of our analysis show, however, that there exist no significant relationship between the yield levels per acre and the levels of farm employment.

d.) <u>The Effects of the Employment Rate</u>

The prairie province are far removed from the industrial sectors in central Canada or on the West Coast. This region contains few large urban areas which could offer employment opportunities to farmers. Therefore, we would expect that farmers would be reluctant to leave the land when times are hard since it would be very difficult to find employment elsewhere. These people would have to compete for fewer available jobs in times of the general economic slowdown of

the provincial economy. This tendency to stay on the farm during "hard times" ought to be greater since, at the very least, the farm offers them a home and sufficient food in times when returns from farm operations are low.

The results of the analysis of the historical data confirm this hypothesis. There exists a significant correlation between the levels of farm employment and the unemployment rate. The higher the unemployment rate, the less likely farmers are to leave the land; and, conversely, the lower the unemployment, the better opportunities for farmers to seek and find employment in other sectors of economy.

e.) Government Subsidies.

In a study prepared for the Economic Council of Canada, George Brinkman states that, like most developed countries, "...Canada has extensive public involvement in the agricultural sector. This involvement ranges from research and extension to direct output subsidies and from public market information to complete pricing and supply regulations by governments or their legislatively sanctioned agencies. Collectively, these measures have tremendous

potential for affecting farm incomes and rates of return." 1)

This involvement on the part of government in the agricultural sector is not a recent phenomenon but rather, it goes back several decades. While the level of financial support has been growing over the years, federal and provincial direct programs payments have increase dramatically since the early 1980s (Table 2).

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1) George L. Brinkman: Farm Income in Canada - a study prepared for the Economic Council of Canada and the Institute for Research on Public Policy, Supply and Services Canada 1981.

TABLE 2

FEDERAL AND PROVINCIAL GROSS DIRECT PROGRAM PAYMENTS

1981 - 1986

	MANITOBA	SASKATCHEWAN	ALBERTA	CANADA
Income Support[a]				
1981	31.3	17.1	31.4	523.8
1982	14.3	38.8	19.9	464.0
1983	35.2	34.5	21.8	478.8
1984	81.3	156.0	89.0	900.5
1985	133.3	333.2	170.1	1,108.8
1986	183.8	512.0	277.6	1,496.9
Disaster Relief[b]				
1981	40.4	147.4	59.6	332.6
1982	27.4	88.4	224.1	400.8
1983	37.0	106.7	100.8	369.8
1984	40.7	201.7	214.1	507.5
1985	35.4	327.7	313.1	753.1
1986	46.3	420.2	368.8	919.9
Production Support[c]				
1981	11.9	19.0	4.6	200.7
1982	13.6	15.6	5.2	252.0
1983	13.5	18.9	5.0	215.7
1984	17.8	34.2	4.7	253.1
1985	21.8	32.5	48.5	337.1
1986	27.5	43.1	175.4	510.4
Total Gross Direct/ Program Payments				
1981	83.6	183.6	95.7	1,057.1
1982	55.3	142.8	249.2	1,116.9
1983	85.7	160.1	127.6	1,064.2
1984	139.8	391.9	307.9	1,661,1
1985	190.4	693.4	531.7	2,199.0
1986	257.6	975.3	821.8	2,927.2

[a] Includes total payments under WGSA, Deficiency Payment, Provincial Income Stabilization, and Dairy Supplementary.

[b] Includes Crop Insurance and Other Supplementary Payments

[c] Includes fuel, interest, fertilizer, feed, pesticide, tax rebates to producers.

Source: Agriculture Canada, Farm Financial Assessment Report August 1987.

Agricultural producers receive direct government assistance to help offset unfavorable economic events and natural disasters over which farmers have no control. As mentioned above, this assistance is provided by both Federal and Provincial governments and can be identified as three basic categories: Income Support, Disaster Relief, and Production Support.

Of the three, Income Support payments of one and a half billion dollars in 1986 represent the largest part of total producer payment. Total gross direct program payments for Canada in 1981 were slightly above one billion dollars; by 1986, this amount almost tripled to three billion dollars. Total support payments in relation to farm receipts indicate a growing importance of government direct assistance to producers. For Manitoba, Saskatchewan, and Alberta total government payouts now represent around 12, 24, and 23 per cent of total cash receipts respectively.

Do government support payments affect employment patterns in the agricultural sector? The results of our analysis show that subsidies paid to producers by the public treasury tend to influence the level of farm employment. In the case of all three Prairie provinces, the evidence demonstrates a positive, albeit weak, correlation between level of support payments and the number of people employed on farms. The

higher the amount of direct payment to farmers, the lower the outflow of farmers (Table A-1).

4. COMPARISON WITH SELECTED FARMING REGIONS IN THE UNITED STATES

4.1 Trends in farm employment 1961 - 1980

The Canadian Prairie provinces and the Plains States in the U.S. share a number of similarities. They all produce wheat, and are similarly located in the western half of the continent. Their geographic location places them far from the areas of heavy industrial concentration and thus greatly reduces opportunities for alternate employment.

In general terms, farms in the Plains States have grown larger and have become fewer in the last 25 years, reflecting very much the same situation in Canada. The size of farms increased as a result of the purchase of additional land from retiring farmers, or non-farmers, who decided that returns were too low.

The Plains States are divided into two groups: the Northern Plains comprising North Dakota, South Dakota, Nebraska, and Kansas; and the Southern Plains which include Oklahoma and Texas. All of these regions have experienced major

structural adjustment in farm employment with some adjusting at a faster rate than others.

4.2 Estimated employment in the Plains States

Farm employment data for the individual Plains States are available for the years up to 1980. Unfortunately, no detailed data is available after that year due to a cutback in funding for the state-wide quarterly surveys, most of which were discontinued in 1981. In order to obtain a series which would be comparable to employment data for the Canadian Prairie provinces, we decided to estimate farm employment for the six Plains States for the years 1981 to 1987. The exception was the state of Kansas, for which we were able to obtain farm employment data from the University of Kansas. For the other Plains States we assumed that the levels of farm employment would track closely the number of farms in each state.

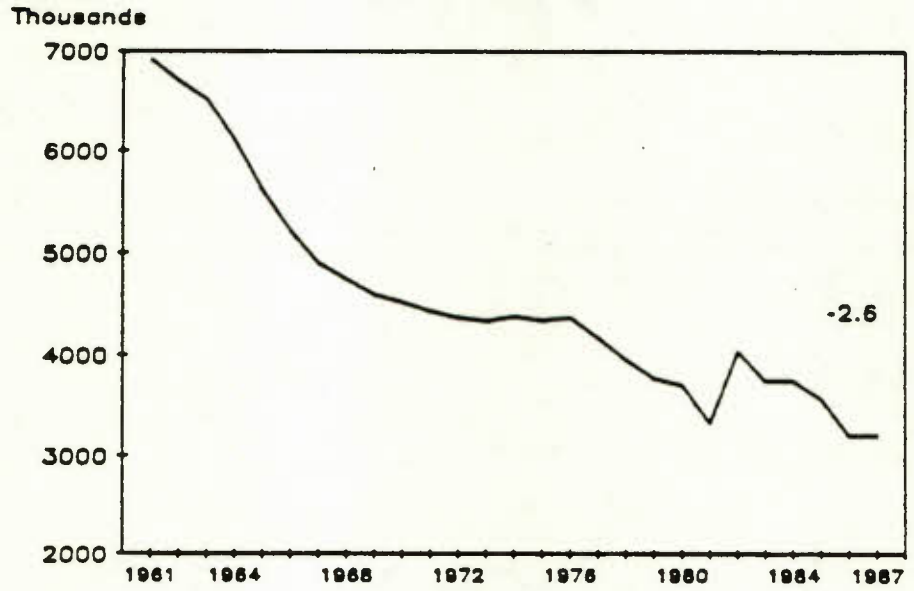
We were able to obtain the data for farm numbers from the U.S. Department of Agriculture for the other five states for the years 1961 to 1987 and thus were able to estimate the employment data for the years 1981 through 1987. We ran regressions on farm employment as a function of the number of farms to test for significant trends. There were none. We estimated, therefore, the mean of historical ratio of

employed worker per farm for the years 1961 to 1980 and estimated the corresponding values for 1981 through 1987.

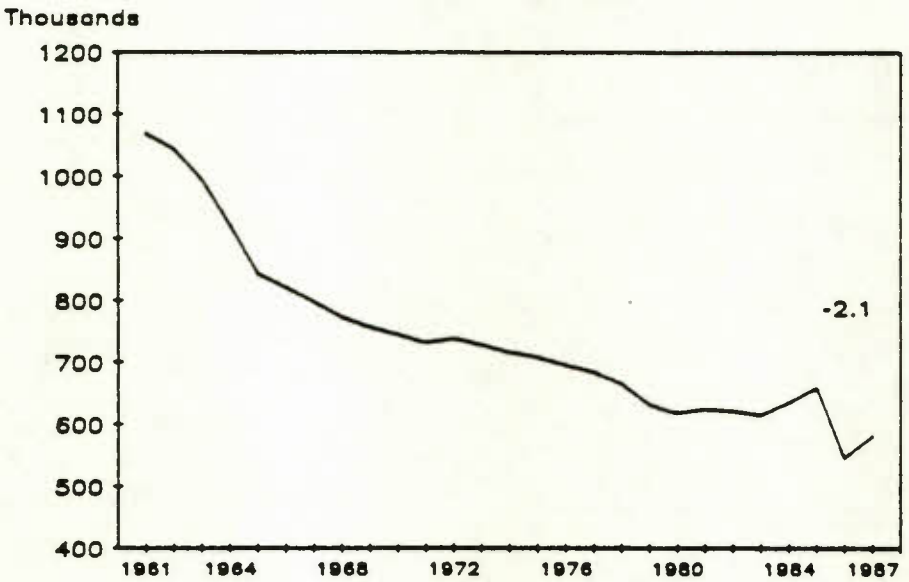
CHART 9

Farm Employment
and Average Annual Rate of Change
1961 - 1987

United States



The Plains States*



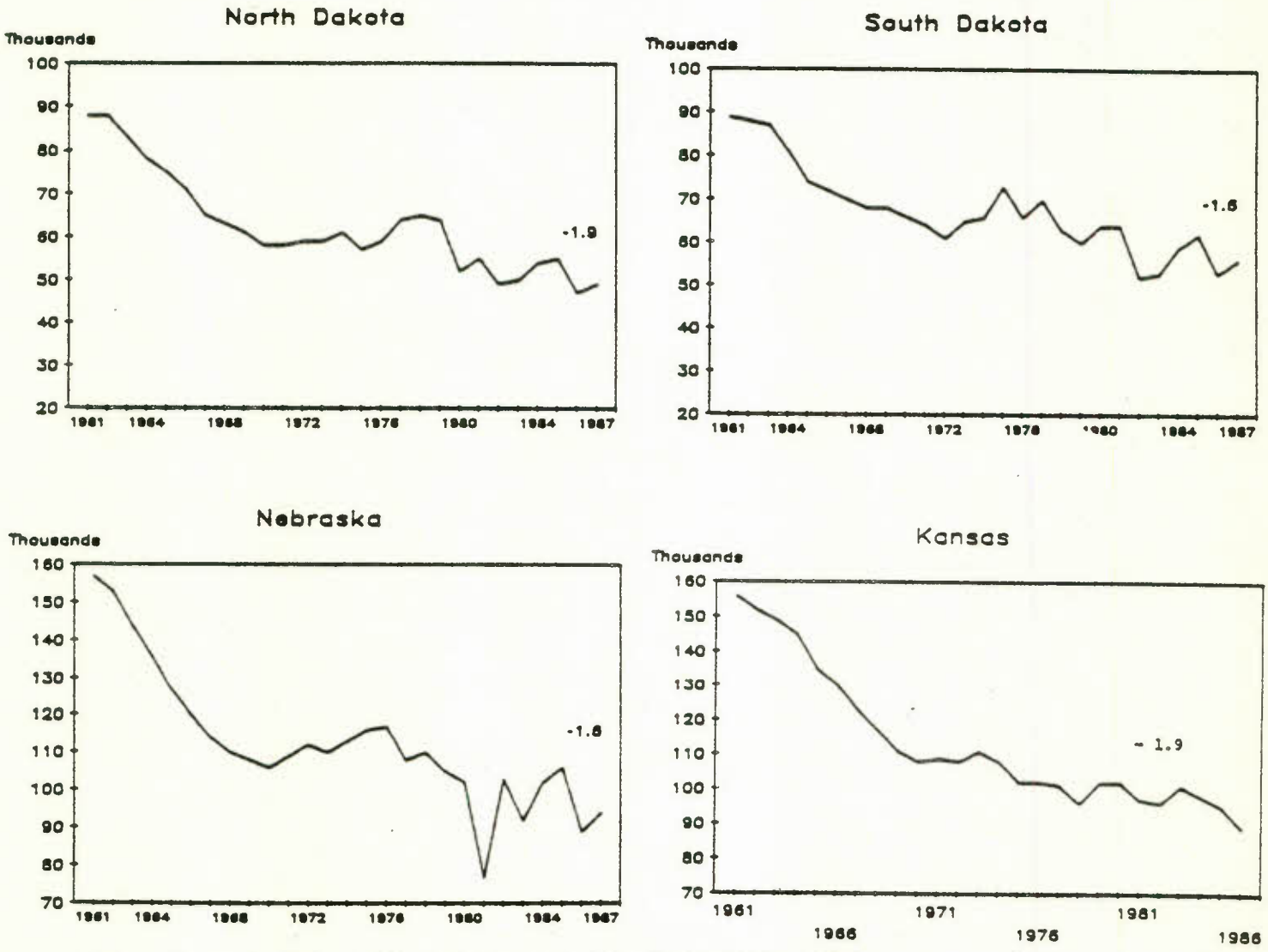
*Estimates from 1981 to 1987.

Note See Appendix B for explanation of the kink in 1981 and 1982 U.S. data.

Source Based on United States Department of Agriculture and estimates by Economic Council of Canada.

CHART 10

Farm Employment
and Average Annual Rate of Change
Northern Plains States, U.S.A.
1961 - 1987

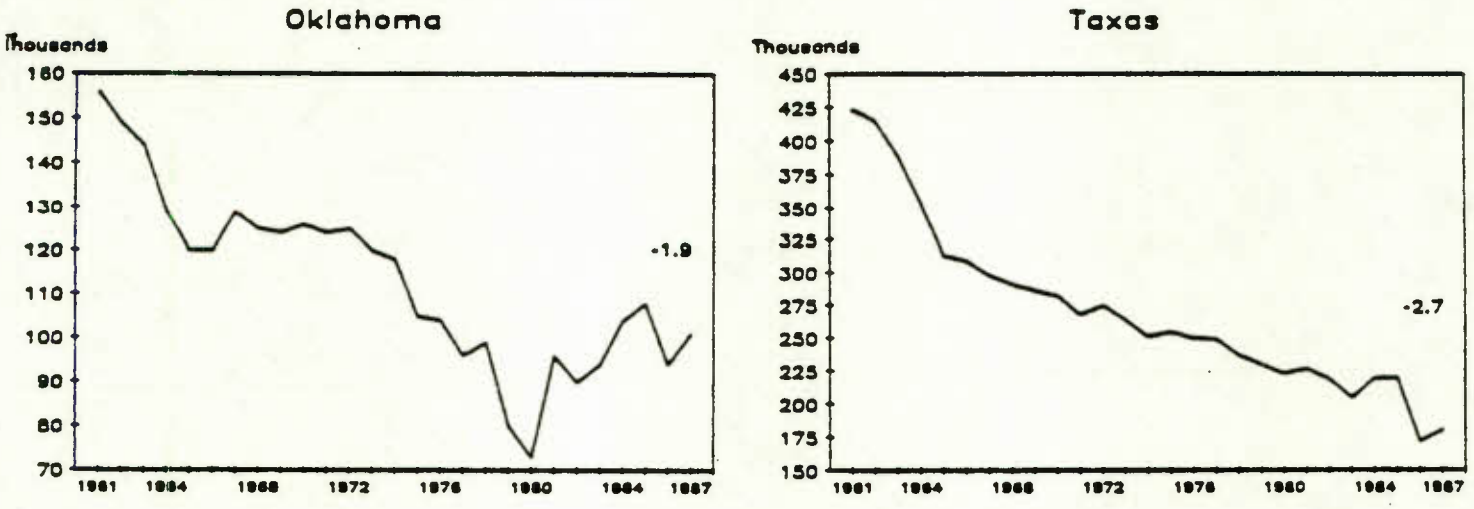


Note Actual data from 1961-1980 and estimated from 1981-1987, except the Kansas data which are actual from 1961 to 1986.

Source Based on United States Department of Agriculture and estimates by Economic Council of Canada.

CHART 11

Farm Employment
and Average Annual Rate of Change
Southern Plains States, U.S.A.
1961 - 1987



Source Based on United States Department of Agriculture and estimates by Economic Council of Canada.

Our statistical estimates show that for the period between 1961 and 1987 the adjustment in farm employment in the Plains states was a shade slower than in the Prairie provinces. While some states adjusted at a slower rate than some of the Prairie provinces, others, such as Texas show the farmers leaving the land at a faster rate than most. Overall, the Plains States' rate of adjustment for the period of 1961 to 1987 was 2.1 per cent as compared to 2.2 per cent for the Prairie Provinces (Table 3).

TABLE 3

RATES OF ADJUSTMENT IN AGRICULTURAL EMPLOYMENT

CANADA AND THE UNITED STATES
1961-1987

CANADA	- 1.2	UNITED STATES	- 2.6
Prairie Provinces	- 2.2	Plains States	- 2.1
Manitoba	- 1.4	North Dakota	- 1.9
Saskatchewan	- 2.5	South Dakota	- 1.6
Alberta	- 2.2	Nebraska	- 1.6
		Kansas	- 1.9
		Oklahama	- 1.9
		Texas	- 2.7

Source Statistics Canada, The Labour Force Survey, unpublished data, U.S. Department of Agriculture, Labour Statistics and Estimates of Economic Council of Canada

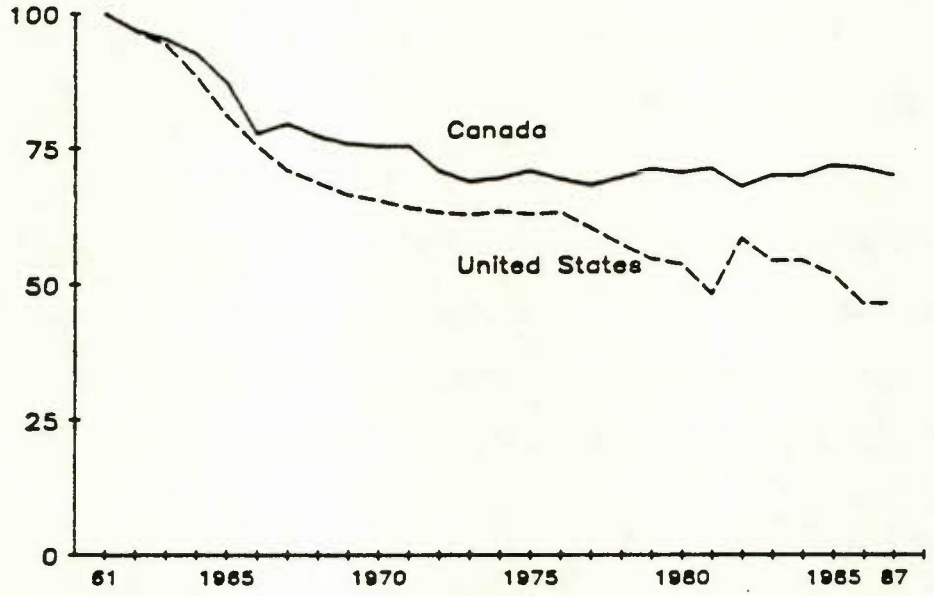
The number of farms in the United States too have been steadily declining. There were slightly more than two and a quarter million farms in the United States in 1985; and according to one study prepared by the U.S. Department of Agriculture, the number of U.S. farms will continue to decline through the end of this century to about 1.8 million in 2000.

4.3 Canada - United States

In general terms, our research and analysis of the available data show that the agricultural sectors of both countries underwent significant structural adjustments during the last quarter century. The United States, on the whole, adjusted at a faster rate than Canada. In other words, farmers in the U.S. were leaving the land in proportionately larger numbers than the Canadian ones. Indeed, while the Canadian trend of farm employment flattened out and turned slightly up in the last half dozen years or so, the employment in the American agriculture as the whole has continued on the downward trend right into the 1980's and up to the present (Chart 12).

CHART 12

Trends in Agricultural Employment
Canada and the United States, 1961-87
1961=100



Note See Appendix B for explanation of the kink in 1981 and 1982 U.S. data.

Source Based on data from Statistics Canada, and United States Department of Agriculture, and estimates by Economic Council of Canada.

5. INTERNATIONAL COMPARISON OVER THE LAST 25 YEARS

5.1 The European Economic Council

Structural adjustments in agricultural sector and the consequent employment shifts out of farming is not a uniquely Canadian or United States phenomenon. Other grain producing countries and our major competitors on world markets such as Australia and the European Economics Community have experienced similar adjustments. Argentina too, is one of the major wheat producing and wheat exporting countries in the world.

A number of the E.C.C. member states are not only self-sufficient in grain production, but some of them, notably France and the United Kingdom are also net exporters of wheat. France, in particular, is one of the major producers and exporter of wheat, competing for its share of world markets.

Faced with major structural shifts in their agricultural sector, the Community some time ago recognized the need for working out a common policy on agricultural structures. Already in 1961, work began on developing a structural policy.

In essence, the objectives as outlined in the paper on "A New Common Agricultural Structure Policy", include that of increasing the productivity of farms by ensuring the optimum combination of the factors of production and that of making proper allowances for the social nature of farming, regional differences, and the close links between agriculture and the general economy.[2]

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2) Green Europe, Newsletter on the Common Agricultural Policy: A New Common Agricultural Structure Policy, Bruxelles, Belgium, 1983.

The common agricultural policy is now facing a very critical period. Structural surpluses abound in case of many farm products including cereals. These are largely due to the development and application of new farm technology over the past twenty five years of so.

Basically, this technology has been labour saving and capital increasing. Consequently, the period between 1960 and 1975 witnessed a significant migration of surplus labour from farming. According to the 1986 Report on the Agricultural Situation in the Community this phenomenon is due to the "push" effect of new technology and the "pull" effect of better paying employment opportunities in the non-agricultural sector of the economy.

The move towards modernization of farms was one of the underpinnings of the new common agricultural policy. As the result of this thrust the increased level of mechanization, generous application of fertilizers, and the development and introduction of new strains of grains increased the yield dramatically. Among the member states, United Kingdom and France achieved particularly strong advances in yield improvements, vastly outperforming other major wheat producers including Canada and the United States.

Mechanization and yield technology greatly expanded the production without additional labour inputs; in fact, new

technology replaced many farm workers rendering a large number of the farm labour force underutilized and redundant.

On the other hand, the expansion of other industrial sectors resulted in the need for a large supply of labour to run the new plants and factories. This development provided opportunities for employment and steady income for the surplus farm workers and for those also found employment in the non-farm sector more attractive.

On the whole, over the past quarter century, farm employment in the Community has adjusted faster than in either Canada or the United States. (Table 4.) The rates of decline differ, but they demonstrate that in each country the proportion of the population engaged in Agricultural activities has been shrinking over the years.

TABLE 4

AVERAGE ANNUAL RATES OF OUTMIGRATION IN AGRICULTURAL SECTOR IN THE EUROPEAN ECONOMIC COMMUNITY 1960 - 1986

	Per cent
E.E.C. 12	3.4
Luxembourg	4.7
Spain	4.1
Belgium	3.9
Italy	3.4
West Germany	3.8
France	3.8
Ireland	3.2
Denmark*	2.6
Greece	2.1
United Kingdom	2.3
Portugal	2.0
The Netherlands	1.8
Canada**	1.2
United States**	2.6

* 1960 to 1985
** 1961 to 1987

Source: The Agricultural Situation in the Community 1986 Report; Brussells, Luxembourg, 1987, and xeroxed material containing revised data and 1986 values made available to us by the E.E.C. Commission, Ottawa.

Statistics Canada, The Labour Force, and estimates by Economic Council of Canada.

U.S. Department of Agriculture, Farm Labour, and estimates by Economic Council of Canada.

5.2 Australia

Of all the countries examined in our study, Australia's agricultural sector has experienced the slowest outflow from farm employment. While structural adjustments certainly have taken place over the last 25 years, the rate has been quite low compared with Canada and other grain producing countries. In other words, Australian farmers are leaving the land at an average rate of 0.65 per cent per year which is substantially lower than that of Canada or the United States, or indeed, the European Economic Community (see Table 4).

Interestingly, just as in Canada in recent years, in Australia's as well, the downward adjustment in farm employment shifted direction indicating now a net increase in the number of farmers. After bottoming out in 1979, the level of farm employment has been rising. In fact, the growth in each category of rural employment in 1985-86 is unexpectedly strong. According to the Australian Bureau of Agricultural Economics, it may reflect a combination of factors such as shifts to more labour intensive rural industries, and a changing perception of work of women on farms.

Unlike Canada, the United States, and the E.E.C., Australia has no government sponsored farm income support programme.

The Australian Wheat Board establishes a five year marketing plan, and as part of this plan, each year it sets a guaranteed minimum price for wheat. If the price of wheat fetched by farmers falls below this guaranteed minimum price, the Wheat Board borrows from the federal government sufficient funds to compensate the farmers for the difference. These funds are then paid back by the producers when the price of wheat received for sales exceeds the guaranteed minimum price.

In the most recent years, sizable portions of land have been taken out of wheat production. Last year's reduction accounted for 17 per cent of wheat acreage, and this year, another 10 per cent was taken out, for a total reduction of 27 per cent. This former wheat growing land has not been kept fallow; part of it has been diverted to growing other cereals such as barley, and the rest of it allocated to other agricultural activity.

APPENDIX A

Notes on employment data for Canadian agriculture

The data measuring employment in Canadian agriculture used in this paper were published by the Labour Force Survey division of Statistics Canada. In 1975, Statistics Canada introduced a new Revised Labour Force Survey (R.L.F.S.) which incorporated several changes in the definitions and scope of the survey. Prior to 1975, for the purposes of the old Labour Force Survey (L.F.S.), the labour force was defined as being composed of that portion of the Canadian non-institutional population which was 14 years of age and over. Starting with 1975 that age was changed to 15 years and older.

With regard to the agricultural sector, the difference between the L.F.S. and R.L.F.S. definitions of employment consists of one minor restriction used in the L.F.S.. In the L.F.S., married females working on farms as unpaid family workers who worked 20 hours or less in reference week were not counted as employed. The R.L.F.S. which used much more specific questions to identify the work activities contains no such restrictions.

The historical series on employment in agriculture for total Canada based on population of 15 years and over go back to 1966 (see The Labour Force, November 1985, Cat. No. 71-001). Prior to that year, they are based on 14+ definition. No adjusted data

prior to 1975 were available for the three Prairie provinces. We therefore made our own adjustments to the agricultural employment data for the years 1961-1974. We obtained from the Labour Force Survey division at Statistics Canada the data for the year 1975 based both on the L.F.S. and R.L.F.S.. We calculated the ratio of the two surveys for that year and then applied it to the historical series.

The regression analysis showed a much better fit using adjusted series in the case of Saskatchewan and Alberta, whereas the adjusted series for Manitoba proved to be inferior. We decided to use the adjusted employment data for Saskatchewan and Alberta, and the unadjusted ones for Manitoba.

Data on farm employment by type of worker which were used in Chart 4 and appear in Tables 2A, 3A, and 4A have not been adjusted for the years prior to 1975. In Chart 4 we show a break between 1974 and 1975 separating the old series from the one based on the new concepts.

Specification of the regression equation

Farm employment can be specified as a function of several variables as depicted in the following equation:

$$E = f\ (t,\ u_{t-1},\ Pw_{t-1})$$

where E = employment in agriculture

t = time trend

u_{t-1} = unemployment rate of the previous year

Pw_{t-1} = price of wheat received by farmers for the previous year's crop

G = government direct program payments.

Expressed in terms of natural logarithms, we can state it thus:

$$\ln_e E_{agr} = a + b \ln t + c \ln u + d \ln Pw + f \ln G$$

or alternatively,

$$E = e^a * t^b * u^c * p_w^d * G^f * e^u$$

where e^u is the error term.

Results of estimation

The time trend coefficients are negative for all the three Prairie provinces as well as for Canada. They indicate declining farm employment levels in Manitoba, Saskatchewan, Alberta, and in Canada. Farm employment has been declining at an average annual rate of -.021 for Manitoba, -.036 for Saskatchewan, and -.028 for Alberta, which implies a decline of 2.1 per cent, 3.6 per cent, and 2.8 per cent per year respectively. Canada's rate of 1.9 per

cent per year signifies that the Prairie region has been experiencing a higher level of outmigration of farmers than the rest of the country.

Modifying this trend are several other factors, the unemployment rate, and the price that the farmers receive for wheat. A positive unemployment rate implies that people tend to stay on the farm. The higher the level of unemployment rate, the less likely it is for farmers to leave agriculture and seek employment elsewhere. The levels of farm employment are affected also by the wheat price. The higher the price that farmers fetch for their wheat the slower the rate of outmigration. We lagged the wheat price variable because farm receipts in the prairie region often do not relate to the current year but to the preceding year. The coefficient for Canada is very small and insignificant, underlying the fact that in terms of Canadian agriculture, wheat represents only one part of the total production.

TABLE A-1

REGRESSION ESTIMATES OF FARM EMPLOYMENT
CANADA AND THE PRAIRIE PROVINCES
1961-1986

	CANADA	PRAIRIE PROVINCES[1]		
		MAN	SASK	ALTA
Excluding Direct Program Payments				
R^2 Coefficient (adjusted)	.787	.496	.916	.882
Constant term	5.707**	3.282**	4.04**	4.013**
Time trend (t_{1981}=0)	-.019**	-.021**	-.036**	-0.28**
Unemployment rate (t-1)	.209**	.200+	.211**	.136**
Wheat price deflated by farm input price (t-1)	.003	.040	.065	.137*
Including Direct Program Payments				
R^2 Coefficient		.517	.915	.871
Constant term		2.592**	3.797**	3.927**
Time trend (t_{1981}=0)		-.021**	-0.36**	-.028**
Unemployment rate (t-1)		.156	.197**	.132*
Wheat price deflated by farm input price (t-1)		.041	.061	.125+
Direct program payments		.17+	.051	.024

The notations **, *, + denote statistical significance at the 1, 5 and 10 per cent levels respectively.

1) Regression estimates for the Prairie provinces in the upper panel are for the period of 1961 to 1985.

TABLE 1A

EMPLOYMENT IN AGRICULTURE
CANADA AND THE PRAIRIE PROVINCES
1961-1987
(thousands)

YEAR	CANADA	PRAIRIES	MANITOBA	SASK	ALBERTA
1961	681	363	67	161	135
1962	660	365	62	165	138
1963	649	366	62	164	140
1964	630	362	61	164	137
1965	594	332	56	151	125
1966	529	282	50	116	116
1967	542	287	50	115	122
1968	526	271	47	113	111
1969	516	287	49	122	116
1970	513	265	43	108	116
1971	514	274	46	113	115
1972	483	269	40	113	116
1973	469	256	36	106	114
1974	474	266	41	107	118
1975	483	258	41	106	111
1976	472	247	38	93	116
1977	464	226	42	98	86
1978	474	229	44	101	84
1979	484	228	46	99	83
1980	479	216	44	87	85
1981	485	216	43	85	88
1982	462	203	41	85	77
1983	476	208	41	87	80
1984	476	219	42	89	88
1985	488	217	47	86	84
1986	484	222	46	89	87
1987	475	223	41	92	90
1988*	n.a.	192	38	77	77
1989	n.a.	188	37	75	75
1990	n.a.	184	37	73	74
1991	n.a.	180	36	71	72
1992	n.a.	176	36	69	71
1993	n.a.	172	35	68	69
1994	n.a.	168	35	66	68
1995	n.a.	165	34	64	66
1996	n.a.	161	34	63	65
1997	n.a.	158	33	61	63
1998	n.a.	154	33	60	62
1999	n.a.	151	33	58	61
2000	n.a.	148	33	57	59

Source: Statistics Canada, The Labour Force, and estimates by Economic Council of Canada.

* Estimated values

TABLE 2A

EMPLOYED IN AGRICULTURE BY TYPE OF WORKERS

(in thousands)

MANITOBA

YEAR	PAID	UNPAID	SELF EMPL'D	TOTAL
1966	6	10	35	51
1967	5	9	36	50
1968	6	10	32	48
1969	7	9	32	48
1970	6	8	29	43
1971	7	10	30	47
1972	6	8	26	40
1973	6	6	24	36
1974	7	7	26	40
1975	8	6	27	41
1976	8	9	22	39
1977	11	7	24	42
1978	11	7	25	43
1979	10	9	26	45
1980	10	8	26	44
1981	10	8	25	43
1982	10	7	25	42
1983	11	7	23	41
1984	12	6	24	42
1985	12	7	28	47
1986	12	7	28	47
1987	13	5	25	43

Source Statistics Canada, Labour Force Survey (unpublished).

TABLE 3A

EMPLOYED IN AGRICULTURE BY TYPE OF WORKERS

(in thousands)

SASKATCHEWAN

YEAR	PAID	UNPAID	SELF EMPL'D	TOTAL
1966	7	14	71	92
1967	8	13	71	92
1968	7	13	73	93
1969	6	17	73	96
1970	8	13	65	86
1971	9	16	65	90
1972	11	15	64	90
1973	10	12	61	83
1974	8	14	63	85
1975	19	20	67	106
1976	15	17	60	92
1977	17	19	62	98
1978	16	20	65	101
1979	17	18	63	98
1980	16	15	56	87
1981	15	15	55	85
1982	17	13	55	85
1983	17	13	57	87
1984	19	12	59	90
1985	16	13	57	86
1986	18	14	57	89
1987	23	13	58	94

Source Statistics Canada, Labour Force Survey (unpublished).

TABLE 4A

EMPLOYED IN AGRICULTURE BY TYPE OF WORKERS

(in thousands)

ALBERTA

YEAR	PAID	UNPAID	SELF EMPL'D	TOTAL
1966	14	18	59	91
1967	15	22	58	95
1968	14	17	55	86
1969	15	20	56	91
1970	14	20	55	89
1971	13	20	56	89
1972	17	20	54	91
1973	14	22	53	89
1974	16	21	55	92
1975	28	25	58	111
1976	34	25	57	116
1977	26	17	45	88
1978	20	19	47	86
1979	21	16	47	84
1980	23	13	49	85
1981	22	16	50	88
1982	22	14	41	77
1983	21	14	45	80
1984	23	16	49	88
1985	27	12	45	84
1986	29	14	45	88
1987	35	10	47	92

Source Statistics Canada, Labour Force Survey (unpublished).

TABLE 5A

EMPLOYED IN AGRICULTURE BY TYPE OF WORKERS

(in thousands)

PRAIRIE REGION

YEAR	PAID	UNPAID	SELF EMPL'D	TOTAL
1966	27	42	165	234
1967	28	44	165	237
1968	27	40	160	227
1969	28	46	161	235
1970	28	41	149	218
1971	29	46	151	226
1972	34	43	144	221
1973	30	40	138	208
1974	31	42	144	228
1975	55	51	152	258
1976	57	51	139	247
1977	54	43	131	228
1978	47	46	137	230
1979	48	43	136	227
1980	49	36	131	216
1981	47	39	130	216
1982	49	34	121	204
1983	49	34	125	208
1984	54	34	132	220
1985	55	32	130	207
1986	59	35	130	224
1987	71	28	130	229

Source Statistics Canada, Labour Force Survey (unpublished).

TABLE 6A

UNEMPLOYMENT RATE IN CANADA
AND THE PRAIRIE REGIONS
1961-1987

YEAR	CANADA	MANITOBA	SASK	ALBERTA
1961	7.1	5.0	4.1	4.7
1962	5.9	4.4	3.3	4.0
1963	5.5	4.4	2.8	3.7
1964	4.7	3.2	2.7	3.3
1965	3.9	2.8	2.4	2.6
1966	3.4	2.8	1.5	2.5
1967	3.8	3.0	1.7	2.7
1968	4.5	3.9	2.4	3.3
1969	4.4	3.2	3.2	3.4
1970	5.7	5.3	4.2	5.1
1971	6.2	5.7	3.5	5.7
1972	6.2	5.4	4.4	5.6
1973	5.5	4.6	3.5	5.3
1974	5.3	3.6	2.8	3.5
1975	6.9	4.5	2.9	4.1
1976	7.1	4.7	3.9	4.0
1977	8.1	5.9	4.5	4.5
1978	8.3	6.5	4.9	4.7
1979	7.4	5.3	4.2	3.9
1980	7.5	5.5	4.4	3.7
1981	7.5	5.9	4.7	3.8
1982	11.0	8.5	6.2	7.7
1983	11.9	9.4	7.4	10.8
1984	11.3	8.3	8.0	11.2
1985	10.5	8.1	8.1	10.1
1986	9.6	7.7	7.7	9.8
1987	8.9	7.4	7.3	9.6

Source: Statistics Canada, The Labour Force.

TABLE 7A

VALUE PER ACRE OF FARMLAND AND BUILDINGS (*)
(dollars)

YEAR	CANADA	MANITOBA	SASK	ALBERTA
1961	50	40	29	36
1962	52	40	31	38
1963	55	43	35	42
1964	61	49	40	46
1965	68	56	47	53
1966	76	62	54	59
1967	86	71	62	67
1968	95	78	66	74
1969	97	74	61	72
1970	98	73	60	72
1971	100	72	59	71
1972	108	77	60	84
1973	131	92	71	104
1974	171	120	90	140
1975	217	141	117	180
1976	257	169	142	213
1977	296	199	162	251
1978	351	247	198	299
1979	434	291	241	424
1980	547	354	332	544
1981	615	410	382	600
1982	619	369	409	606
1983	593	358	397	569
1984	568	336	381	529
1985	526	319	343	497
1986	488	297	316	457
1987	439	277	268	419

(*) Census Reconciled (1981 census)

Source Farm Credit Corporation.

Note The revised data released by Statistics Canada in April 1988 arrived after the regressions were fitted. For the sake of completeness we supply Table 7.1A which contains the revised data from 1982 through 1987.

TABLE 7.1 A

VALUE PER ACRE OF FARMLAND AND BUILDINGS
REVISED DATA
(dollars)

YEAR	CANADA	MANITOBA	SASK	ALBERTA
1982	614	380	413	592
1983	586	380	405	543
1984	558	367	393	493
1985	517	359	357	453
1986	478	344	332	407
1987	442	320	282	387

Source Statistics Canada, Agriculture Division.

TABLE 8A

NET FARM INCOME
CANADA AND THE PRAIRIE PROVINCES

(in thousands of dollars)

YEAR	CANADA	MANITOBA	SASK	ALBERTA
1961	841,125	44,828	88,238	190,309
1962	1,448,525	158,737	457,887	270,292
1963	1,445,665	106,558	546,837	282,088
1964	1,205,455	155,750	334,349	227,652
1965	1,484,854	164,129	469,653	286,540
1966	1,841,427	137,483	555,957	352,366
1967	1,383,971	152,256	333,247	261,382
1968	1,649,780	162,812	453,565	335,154
1969	1,505,973	117,814	417,287	250,780
1970	1,275,635	88,774	240,999	219,057
1971	1,438,545	152,176	467,098	222,848
1972	1,631,736	168,401	394,917	317,717
1973	3,203,006	370,426	902,461	629,666
1974	3,499,181	319,193	1,153,328	669,325
1975	4,049,717	397,176	1,487,437	743,566
1976	3,222,499	282,500	1,235,106	540,408
1977	2,663,942	288,205	789,512	322,658
1978	3,293,697	349,342	881,568	617,887
1979	3,559,740	247,250	802,910	719,732
1980	3,085,528	47,412	648,391	756,062
1981	4,566,504	419,689	1,574,572	794,268
1982	3,482,376	300,310	1,108,735	544,750
1983	2,700,223	83,046	582,171	346,118
1984	3,383,250	367,661	333,790	290,291
1985	4,331,122	656,884	877,767	450,311
1986	5,840,245	465,546	1,434,697	1,243,992

Source Statistics Canada, Agriculture Economic Statistics, Cat. no. 21-603.

TABLE 9A

NET FARM INCOME PER EMPLOYED WORKER
(dollars)

YEAR	MANITOBA	SASK	ALTA
1961	747	548	1,409
1962	2,886	2,775	1,958
1963	1,937	3,334	2,014
1964	2,831	2,038	1,661
1965	3,282	3,110	2,292
1966	3,055	4,792	3,037
1967	3,460	2,897	2,142
1968	3,876	4,013	3,019
1969	2,739	3,420	2,161
1970	2,276	2,231	1,921
1971	3,711	4,133	1,937
1972	4,677	3,494	2,738
1973	11,575	8,513	5,523
1974	8,866	10,778	5,672
1975	9,687	14,032	6,698
1976	7,434	13,280	4,658
1977	6,862	8,056	3,751
1978	7,939	8,728	7,355
1979	5,375	8,110	8,671
1980	1,077	7,452	8,894
1981	9,760	18,524	9,025
1982	7,324	13,043	7,074
1983	2,025	6,691	4,326
1984	8,753	3,750	3,298
1985	13,976	10,206	5,360
1986	10,120	16,120	14,298

Source Statistics Canada, Agriculture Economic Statistics, Cat. no. 21-603, and estimates by the Economic Council of Canada.

TABLE 10A

PRICE OF WHEAT

CANADA AND THE PRAIRIE PROVINCES

(dollars)

YEAR	CANADA	MAN	SASK	ALTA
1961	1.72	1.76	1.75	1.72
1962	1.66	1.70	1.67	1.62
1963	1.74	1.71	1.75	1.73
1964	1.59	1.63	1.60	1.55
1965	1.68	1.65	1.70	1.64
1966	1.76	1.78	1.77	1.73
1967	1.63	1.64	1.62	1.61
1968	1.34	1.31	1.34	1.31
1969	1.27	1.24	1.29	1.17
1970	1.44	1.42	1.45	1.35
1971	1.35	1.37	1.35	1.30
1972	1.86	1.86	1.88	1.84
1973	4.47	4.30	4.60	4.24
1974	4.21	4.00	4.33	3.96
1975	3.62	3.53	3.68	3.51
1976	2.87	2.80	2.90	2.80
1977	2.82	2.67	2.85	2.75
1978	3.78	3.61	3.85	3.66
1979	4.79	4.62	4.87	4.86
1980	5.54	5.52	5.71	5.36
1981	5.02	4.75	5.12	5.03
1982	4.60	4.48	4.68	4.54
1983	4.79	4.74	4.88	4.70
1984	4.67	4.67	4.80	4.43
1985	3.60	3.58	3.65	3.54
1986	2.80	2.83	2.85	2.55

Source Statistics Canada, CANSIM Matrix 1025.

TABLE 11A

WHEAT PRICE DEFLATED BY FARM INPUT PRICE INDEX*

PRAIRIE PROVINCES

(dollars)

YEAR	MAN	SASK	ALTA	PRICE INDEX*
1961	7.21	7.17	7.05	24.40
1962	6.51	6.40	6.21	26.10
1963	6.33	6.48	6.41	27.00
1964	6.06	5.95	5.76	26.90
1965	5.91	6.09	5.88	27.90
1966	6.05	6.02	5.88	29.40
1967	5.52	5.45	5.42	29.70
1968	4.28	4.40	4.28	30.60
1969	3.90	4.06	3.68	31.80
1970	4.44	4.53	4.22	32.00
1971	4.13	4.07	3.92	33.20
1972	5.25	5.31	5.20	35.40
1973	10.41	11.14	10.27	41.30
1974	8.35	9.04	8.27	47.90
1975	6.52	6.80	6.49	54.10
1976	4.83	5.00	4.83	58.00
1977	4.49	4.79	4.62	59.50
1978	5.36	5.71	5.43	67.40
1979	5.86	6.17	6.16	78.90
1980	6.35	6.57	6.17	86.90
1981	4.75	5.12	5.03	100.00
1982	4.33	4.53	4.39	103.40
1983	4.58	4.71	4.54	103.60
1984	4.40	4.52	4.17	106.20
1985	3.35	3.42	3.31	106.80
1986	2.61	2.63	2.35	108.30

* for Western Canada

Source Statistics Canada, CANSIM, and estimates by Economic Council of Canada.

TABLE 12A

AVERAGE YIELD PER ACRE, ALL WHEAT

PRAIRIE PROVINCES

(bushels)

YEAR	MAN	SASK	ALTA
1961	11.7	8.5	15.8
1962	26.3	20.4	19.3
1963	19.3	27.5	25.1
1964	25.1	18.1	22.3
1965	24.4	21.6	25.3
1966	24.3	27.7	29.4
1967	25.6	17.2	22.7
1968	26.8	19.6	25.7
1969	25.6	27.0	26.4
1970	21.8	26.2	27.7
1971	29.4	26.7	26.4
1972	26.5	23.5	27.4
1973	25.7	24.0	27.0
1974	21.1	21.0	24.3
1975	25.2	25.5	30.0
1976	27.1	31.1	32.5
1977	31.6	29.1	24.8
1978	30.6	29.2	29.8
1979	25.0	21.9	28.5
1980	21.2	22.8	33.0
1981	31.3	27.1	34.1
1982	34.0	30.8	32.4
1983	27.2	27.0	32.5
1984	30.9	21.1	24.6
1985	40.0	22.9	23.6
1986	33.8	31.6	36.0

Source Statistics Canada, CANSIM Matrix 1025.

TABLE 13A

NUMBER OF FARMS AND AVERAGE SIZE OF FARMS

CANADA 1871-1986

(census years)

YEAR	NUMBER OF FARMS (thousands)	AVERAGE SIZE (acres)
1871	368	98
1881	464	98
1891	542	111
1901	511	124
1911	682	160
1921	711	198
1931	729	224
1941	733	237
1951	623	279
1961	481	359
1966	431	404
1971	366	463
1976	339	499
1981	318	528
1986	293	572

Source Urquhart and Buckley: Historical Statistics of Canada; Statistics Canada: Census of Agriculture, various issues.

APPENDIX B

Notes on United States data on employment in agriculture

The United States data on agricultural employment as made available to us by the United States Department of Agriculture display a kink in 1981 and 1982. This anomaly is a result of deficient surveys and does not reflect an economic observation. In January 1975, quarterly estimates for family and hired workers replaced monthly estimates which had begun in 1950. However, these quarterly estimates were dropped following the April 1981 surveys because of a cutback in funding. Thus, the 1981 annual value is based on the January and April surveys and appears to underestimate the number of farm employment since it does not capture the peak of summer activities.

In 1982 and 1983, only one survey was completed each year in July. In July 1984, quarterly surveys were reinstated, but estimates were provided for only three individual states - California, Florida, and Hawaii; all other states, except Alaska were aggregated into 15 regions. Consequently, we calculated our own estimates for the individual Plains States, except for the state of Kansas for which we obtained the data from the University of Kansas.

TABLE 1B

FARM EMPLOYMENT IN THE UNITED STATES

AND SELECTED STATES

1961 - 1987

(thousands)

Year	United States	North Dakota	South Dakota	Nebraska	Kansas	Oklahoma	Texas
1961	6,919	88	89	157	156	156	424
1962	6,700	88	88	153	152	149	415
1963	6,518	83	87	144	149	144	389
1964	6,110	78	81	136	145	129	354
1965	5,610	75	74	127	135	120	313
1966	5,214	71	72	120	130	120	309
1967	4,903	65	70	114	123	129	298
1968	4,746	63	68	110	117	125	291
1969	4,596	61	68	108	111	124	286
1970	4,523	58	66	106	108	126	282
1971	4,436	58	64	109	109	124	268
1972	4,373	59	61	112	108	125	275
1973	4,337	59	65	110	111	120	264
1974	4,389	61	66	113	108	118	251
1975	4,342	57	73	116	103	105	255
1976	4,374	59	66	117	100	104	250
1977	4,170	64	70	108	98	96	249
1978	3,957	65	63	110	92	99	237
1979	3,774	64	60	105	95	80	230
1980	3,705	52	64	102	104	73	223
1981	3,330	55	64	77	97	96	227
1982	4,043	49	52	103	96	90	219
1983	3,749	50	53	92	101	94	205
1984	3,750	54	59	102	98	104	220
1985	3,570	55	62	106	95	108	220
1986	3,204	47	53	89	89	94	172
1987	3,211	49	56	94	100	101	181

Note Actual data from 1961-1980 and estimated from 1981-86, except for Kansas data which are actual from 1961-1986.

TABLE 2B

NUMBER OF FARMS

PLAINS STATES

1961 - 1987

(thousands)

Year	North Dakota	South Dakota	Nebraska	Kansas	Oklahoma	Texas
1961	55	57	90	107	101	242
1962	53	56	88	105	99	237
1963	52	55	86	103	97	233
1964	51	54	84	100	96	230
1965	50	52	82	98	95	226
1966	49	51	80	95	94	222
1967	48	50	78	93	93	219
1968	47	49	76	91	91	216
1969	46	48	74	89	90	224
1970	46	47	73	87	90	212
1971	45	46	72	86	89	210
1972	44	46	71	85	88	209
1973	44	46	70	84	87	209
1974	43	45	70	83	87	209
1975	42	43	67	79	75	189
1976	42	42	67	78	74	187
1977	41	41	66	77	74	186
1978	41	40	66	76	73	185
1979	40	39	65	75	72	187
1980	40	39	65	75	72	189
1981	39	38	65	75	73	189
1982	37	38	63	75	73	188
1983	37	37	62	75	73	187
1984	36	37	60	74	73	187
1985	34	37	59	72	71	177
1986	33	36	57	70	71	162
1987	32	35	56	70	70	160

Source U.S. Department of Agriculture, Washington, D.C.

TABLE 3B

EMPLOYMENT IN AGRICULTURE
IN THE EUROPEAN COMMUNITY
1970 - 1986
(thousands)

Year	Eur-12	Belgium	Danmark	Germany	Greece	Spain	France
1970	16,969	174	266	2,262	1,279	3,662	2,752
1971	16,460	161	256	2,134	1,222	3,553	2,612
1972	15,463	151	230	2,018	1,198	3,216	2,470
1973	14,987	144	227	1,924	1,176	3,128	2,345
1974	14,503	139	228	1,842	1,150	2,994	2,242
1975	13,933	136	223	1,773	1,127	2,799	2,156
1976	13,573	128	218	1,682	1,105	2,661	2,082
1977	13,133	123	215	1,589	1,084	2,567	2,013
1978	12,769	118	208	1,536	1,049	2,485	1,955
1979	12,410	118	200	1,481	1,020	2,352	1,908
1980	11,963	112	197	1,437	1,016	2,205	1,854
1981	11,561	109	191	1,408	1,083	2,086	1,791
1982	11,112	106	189	1,395	1,011	2,042	1,732
1983	11,041	106	186	1,391	1,060	2,047	1,677
1984	10,755	106	182	1,376	1,044	1,966	1,627
1985	10,514	105	-	1,360	1,037	1,927	1,581
1986	10,108	103	-	1,345	1,026	17,42	1,536

Year	Ireland	Italy	Luxembourg	Nederlands	Portugal	United Kingdom
1970	283	3,878	13	289	-	792
1971	272	3,875	13	303	-	751
1972	265	3,589	12	293	-	724
1973	255	3,482	12	283	-	726
1974	244	3,401	11	273	-	690
1975	238	3,261	11	263	1,289	678
1976	232	3,228	11	260	1,264	677
1977	228	3,130	10	248	1,285	676
1978	226	3,069	10	256	1,247	671
1979	221	2,989	9	257	1,180	669
1980	209	2,899	9	244	1,178	658
1981	196	2,732	8	247	1,121	644
1982	193	2,522	8	249	1,060	637
1983	189	2,526	7	247	1,026	627
1984	181	2,426	7	247	974	620
1985	171	2,296	7	248	969	631
1986	168	2,242	7	248	890	619

Source Commission of the European Communities: The Agriculture Situation in the community, 1986 Report, Eurostats estimates, and estimates by Economic Council of Canada.

TABLE 4B

RURAL EMPLOYMENT IN AUSTRALIA
1960/61 - 1986/87
(thousands)

1960-61	448.1
1961-62	453.0
1962-63	443.2
1963-64	435.1
1964-65	429.2
1965-66	423.0
1966-67	417.0
1967-68	416.1
1968-69	409.9
1969-70	406.4
1970-71	414.6
1971-72	407.1
1972-73	401.4
1973-74	391.2
1974-75	381.9
1975-76	378.6
1976-77	373.0
1977-78	363.9
1978-79	361.1
1979-80	378.6
1980-81	382.4
1981-82	379.9
1982-83	390.8
1983-84	382.6
1984-85	376.0
1985-86	402.5*
1986-87	393.1

* The growth in each category of rural employment in 1985-1986 is unexpectedly strong. It may reflect a combination of factors such as a shift to more labour intensive rural industries, and a changing perception of work roles of women on farms.

Source Australian Bureau of Agricultural and Resource Economics, Commodity Statistic Bulletin, November 1987.

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